CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical, power, foundry and allied fields.
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JR&SCo

BERTRAM MACHINE TOOLS

JR&SCo

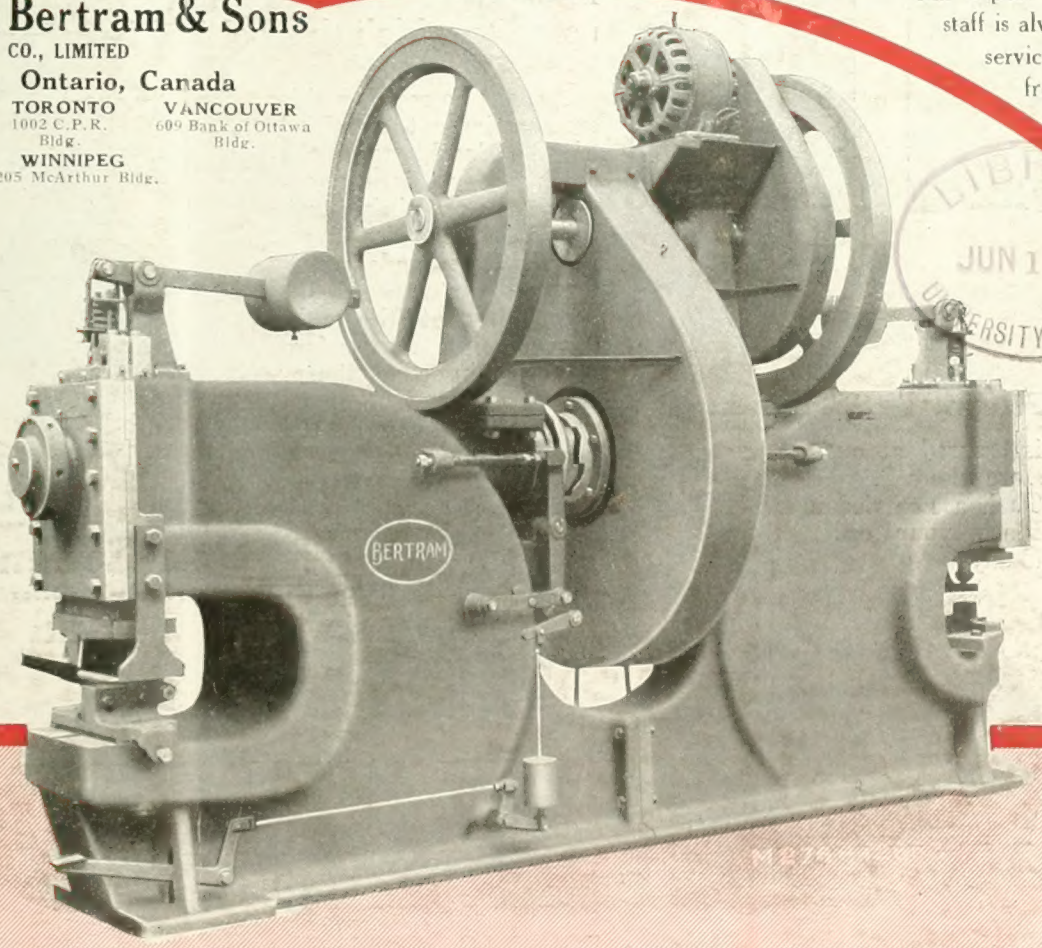
For Structural, Bridge and Ship Building Plants

Bertram Machine Tools typify all that is modern and best in their line. We make a varied assortment of Punches, Shears, Bending and Straightening Rolls, Coping Machines, Rotary and Plate Planers.

The John Bertram & Sons CO., LIMITED
Dundas Ontario, Canada

MONTREAL 723 Drummond Bldg.
TORONTO 1002 C.P.R. Bldg.
VANCOUVER 609 Bank of Ottawa Bldg.
WINNIPEG 1205 McArthur Bldg.

An expert engineering staff is always at your service. Advice free.



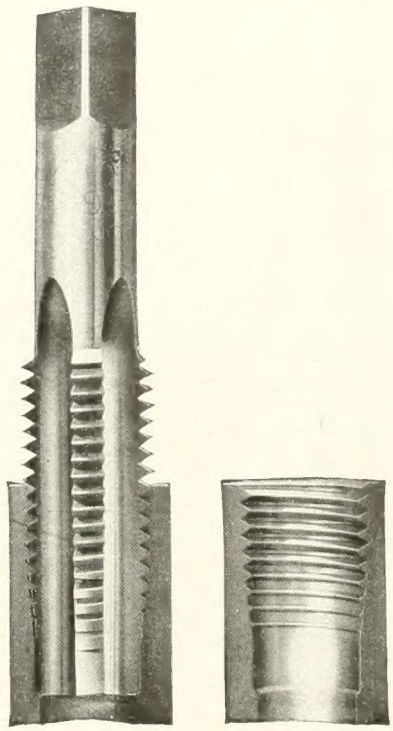
Double Punch and Shear

Capacity — shears 8-in. by 1½-inch plate.

Punches 2½-inch hole in 1½-in. plate.

LIBRARY JUN 16 1922 UNIVERSITY OF TORONTO

SMALL TOOLS



A Test of P. & W. Tap Superiority

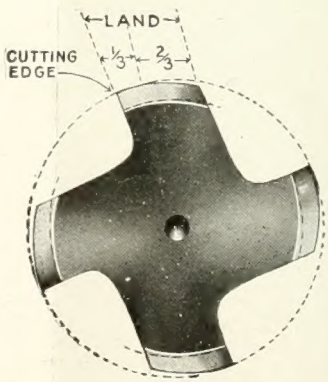
This cut shows a P. & W. Taper Hand Tap, after being forced by power nearly through a nut in which the hole was purposely drilled considerably smaller than the root diameter of the tap. This, of course, left an excessive amount of work for the tap to do. Yet, owing to the design and construction of the tap (notably the cylindrical pilot with relieved chamfer on the point, and the full relief given to the chamfered portion), there was no evidence of imperfect threading or any indication whatsoever of the hard usage to which the tool had been put.

PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

As will be seen by this cross-section cut, one-third of the land from the cutting edge is concentric. The remaining two-thirds is eccentrically relieved. A tap made in this way can be ground for sharpening at the only correct point—on the face of the cutting edge. Sharpening in no way affects its size or the form of the thread.

The Taper has a cylindrical pilot, and on the chamfered portion of the tap, the top of the thread is relieved clear to the cutting edge to secure keen cutting qualities.



The Tap with the Con-Eccentric (Trade-Mark Regd.) Land

PRATT & WHITNEY CO.

of Canada, Limited

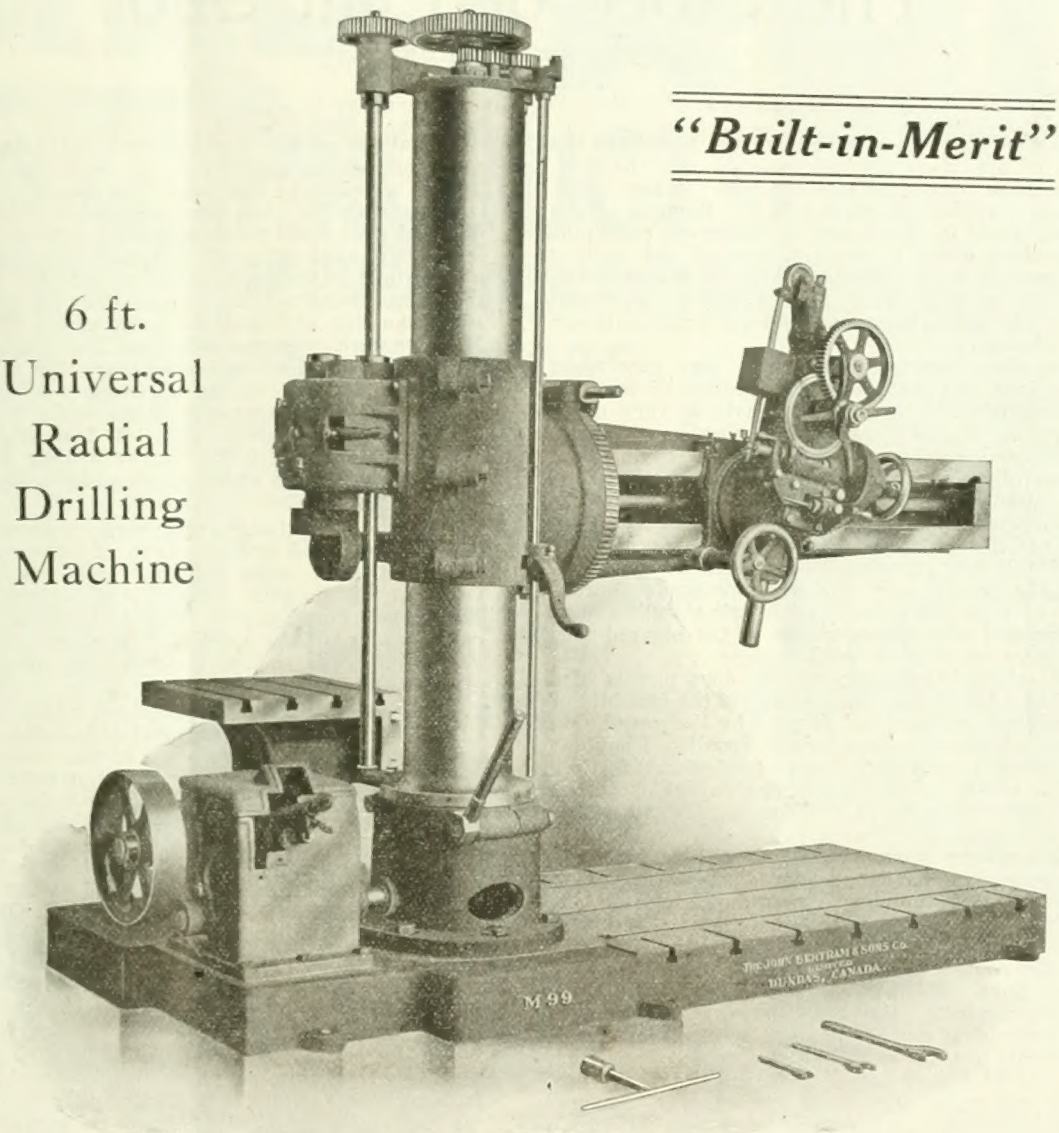
Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS

"Built-in-Merit"

6 ft.
Universal
Radial
Drilling
Machine



DROP US A LINE FOR PHOTOGRAPHS AND FULL DETAILS
on any machine or machines in which you are interested

The John Bertram & Sons Company Limited

DUNDAS, ONTARIO, CANADA

MONTREAL	TORONTO	VANCOUVER	WINNIPEG
723 Drummond Bldg.	1002 C.P.R. Bldg.	609 Bank of Ottawa Bldg.	1205 McArthur Bldg.

If any advertisement interests you, tear it out now and place with letters to be answered.

The Publisher's Page

TORONTO October 25, 1917

The Story of Flint Shot

A STORY OF ADVERTISING

By R. R. Shuman, President Shuman Advertising Company, Chicago

There be still agnostics who refuse to believe the gospel of the class journal appeal. But, happily, their number is growing less and less. In fact, there has been a radical revolution in the thought of the business world in this direction, the grand outstanding proof of which is the fact that all the leading class journals have gained mightily in the advertising they carry in face of the almost universal condition of plants being oversold and practically out of the market.

That class journal advertising does pay when rightly done and that the buying power of the vast audiences reached by these journals is very much worth-while is also illustrated by the beautiful and effective and costly art work and engraving and the carefully thought out copy which are now so widely used by trade journal advertisers in the mediums they select.

How different this is from conditions as they existed only ten years ago! For even at that comparatively recent date the average trade journal page was a jumble of ugly cards left standing until the type and cuts reminded one of the bleared face of the morning after the night before.

That class journal advertising does pay is also proved in a better way than either of the two bits of evidence just referred to. It pays by the grand conclusive evidence of money-in-bank results. I have no more striking example of this proof-of-proofs than the case of the Flint Shot campaign, which it has been my privilege to handle for the United States Silica Company of Chicago.

The company is owned and officered by two alert, courageous young men, seasoned in the ways of modern business, but brave enough to acknowledge that they knew nothing about advertising, and with faith enough in their product and in their counsellor to let the counsellor work out their salvation along his own lines.

Their product, Flint Shot, outwardly resembles silica sand blast sand, and until the campaign was started this product was sold as sand in competition with sand, at a sand price. This, in spite of the fact that it was more than sand, in fact, was a manufactured product secured by disintegrating St. Peter's Rock and separating from it the hard, round tiny flint nodules and washing, drying and screening the nodules to size.

The first problem, therefore, was to show the metal-working world that here was something that was better than sand, lasted two or three times as long as sand, and was worth two or three times as much as sand. Photo-micrographs were used to show the difference between Flint Shot and sand, and the theory was evolved and the case proved to the satisfaction of the counsellor, at least, that the time-honored tradition that sharp sand was necessary to do good work was founded wholly upon an erroneous notion about the function performed by the granules in the sand blast.

How was this theory to be proved to be more than theory?

What better way could there be than to investigate the results obtained in the shops of the customers who bought and used Flint Shot?

This was the plan pursued, and the counsellor traveled over 5,000 miles, spending a month of time in the first-hand study of sand blasting operations in a multitude of different forms of industry in which the Flint Shot was used. These investigations were given the title of "Little Journeys of the Flint Shot Man," and it was the effort of the counsellor to develop in each story practical every-day shop kinks which should be useful to the readers of the Little Journeys. Notable among these kinks were uses discovered for the waste dust left from the process of sand blasting, a dust which is usually separated from the good sand granules either by a centrifugal or bolting separator.

As the advertising campaign progressed the demand increased and the zone of operations widened until they were shipping from the plant at Ottawa, Ill., to both Pacific and Atlantic Coast Points, customers paying what had heretofore been considered prohibitive freight rates in order to get Flint Shot, even though they had deposits of silica sand almost at their doors.

The advertising also developed many new and till-then undiscovered avenues of distribution, greatly widening the field of operation of the company, and giving its outlet a diversity that not only meant a largely increased tonnage, but also the sense of safety that always accompanies a widely diversified demand. The large increase in tonnage due both to widened geographical zone of operation and diversification of industries served has led to the erection by the United States Silica Company, at Ottawa, of a new plant—the largest of the kind in the country.

The Little Journeys, some sixty in all, have been compiled into a book form, the book being, in effect, an authoritative text book on sand blasting in general, the first and only book of the kind ever written and printed.

The advertising campaign itself started out with full-page copy, well illustrated, to take the place of quarter pages that had never shown appreciable results. The magical effect of the change is illustrated by a bulging card index file in the office of the United States Silica Company showing hundreds of cards bearing the names of inquirers who referred to the advertising or used the keys employed to check the media.

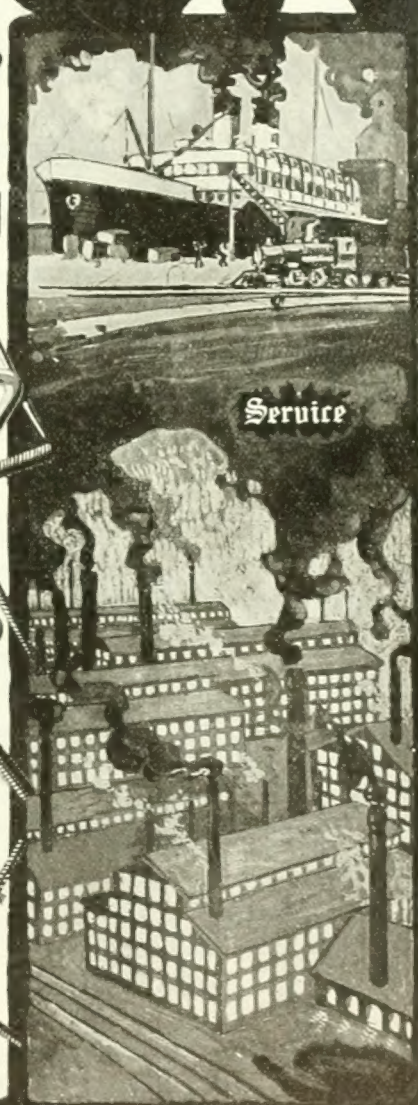
The following publications have been or are being used: **The Iron Age, Foundry, Metal Industry, Brass World, Chilton Automobile Directory, The Automobile Trade Directory, Automobile Trade Journal, CANADIAN MACHINERY, CANADIAN FOUNDRYMAN, The Automobile Builder, The American Drop Forger, American Machinist, American Machine & Tool Record, Metallurgical & Chemical Engineering; Pocket List of Railway Officials.** Nothing but full-page copy is used and ads are never repeated.—Class for October.

STEEL AND IRON

PRODUCTS

OF EVERY DESCRIPTION

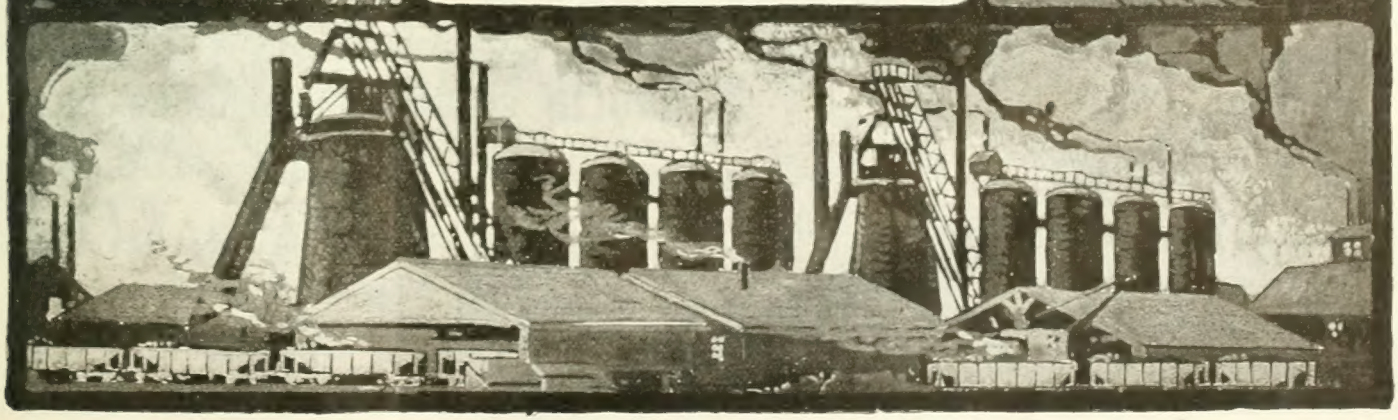
FROM ORE MINES TO EXPORT



THE STEEL COMPANY OF CANADA

LIMITED

HAMILTON MONTREAL



If any advertisement interests you, tear it out now and place with letters to be answered.

The

Fairley Davidson Steel Co., Inc.

SPECIALISTS

	Brand Name:
Hot Working Steels	"Xtof" and "Precision"
High Strength Steels	"Hehtemnd"
High Speed Steel	RUSHITOFF No. 6
Tool and Die Steels	"Fondwot" and "Giant"
Magnet Steels	Tungsten or Chrome
Non-Changeable Die Steel	Nugget "B" oil hardening

CHROME VANADIUM, oil hardening or case hardening

CHROME NICKEL, oil hardening or case hardening

Steam Hammer Forgings to Sketch

We guarantee to supply the correct steel at once, eliminating costly experiments

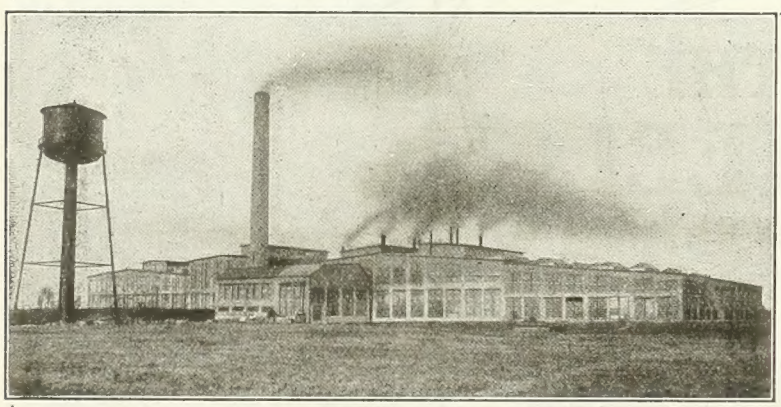
We carry a complete stock at our New York Warehouse, 124 Maiden Lane, New York City

Canadian Agents:

The Canadian Utilities Steel & Engineering, Limited

149 Craig Street West, Montreal, Canada

We carry a complete stock at our Montreal Warehouse



Works: LONGUEUIL, QUE.

Armstrong, Whitworth of Canada Limited

Standard Sizes of

HIGH SPEED STEEL

Carried in Stock

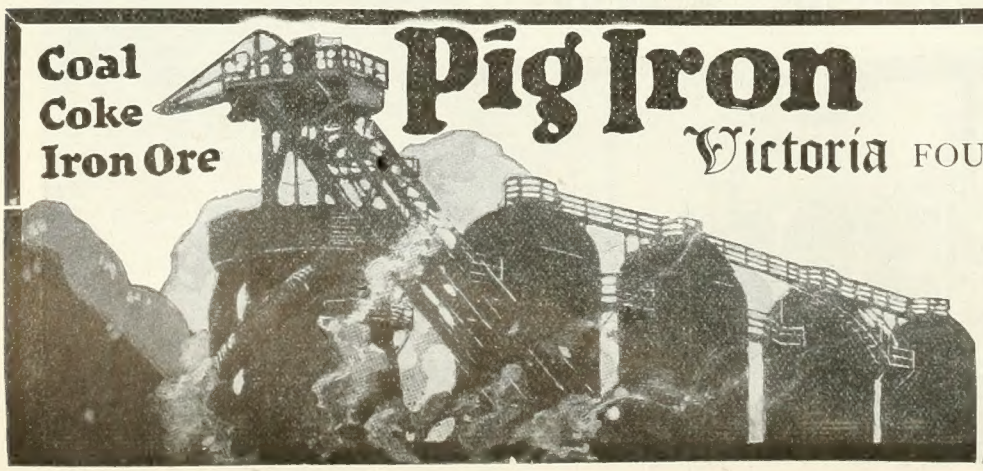
CARBON AND ALLOY STEELS

Shop Tools, Gauges, etc.

HEAD OFFICE: 298-300 St. James St., Montreal

Branches: Dominion Bank Bldg., TORONTO
27 King William Street, HAMILTON
McArthur Bldg., WINNIPEG, MAN.

Coal
Coke
Iron Ore



Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada.

M.A. HANNA & CO.

Sales Agents, CLEVELAND

Canadian Office:

703 C.P.R. Bldg., Toronto

TRADE MARK

of the Famous

"WACO"

BRAND

HIGH SPEED STEEL

AND

TWIST DRILLS

"DOUBLE WACO" Quality

Specially Adapted for Munition Work

"TURTLE" BRAND

High Class Tool Steel, Files, etc., of all descriptions.

ESTABLISHED 1870

WM. ATKINS & CO., LTD

TRADE MARK "WACO"

Reliance Steel Works

SHEFFIELD, ENG.

TRADE MARK

For particulars apply to our

Sole Representatives for Canada

GEO. A. MARSHALL & CO.

70 Lombard Street Toronto, Ontario

QUITE remarkable economies have been effected in turning, planing and shaper work on all kinds of steel, cast iron, bronze and other materials by the new alloy

STELLITE

But we are now able to recommend it for Milling Cutters and Form Tools of all kinds.

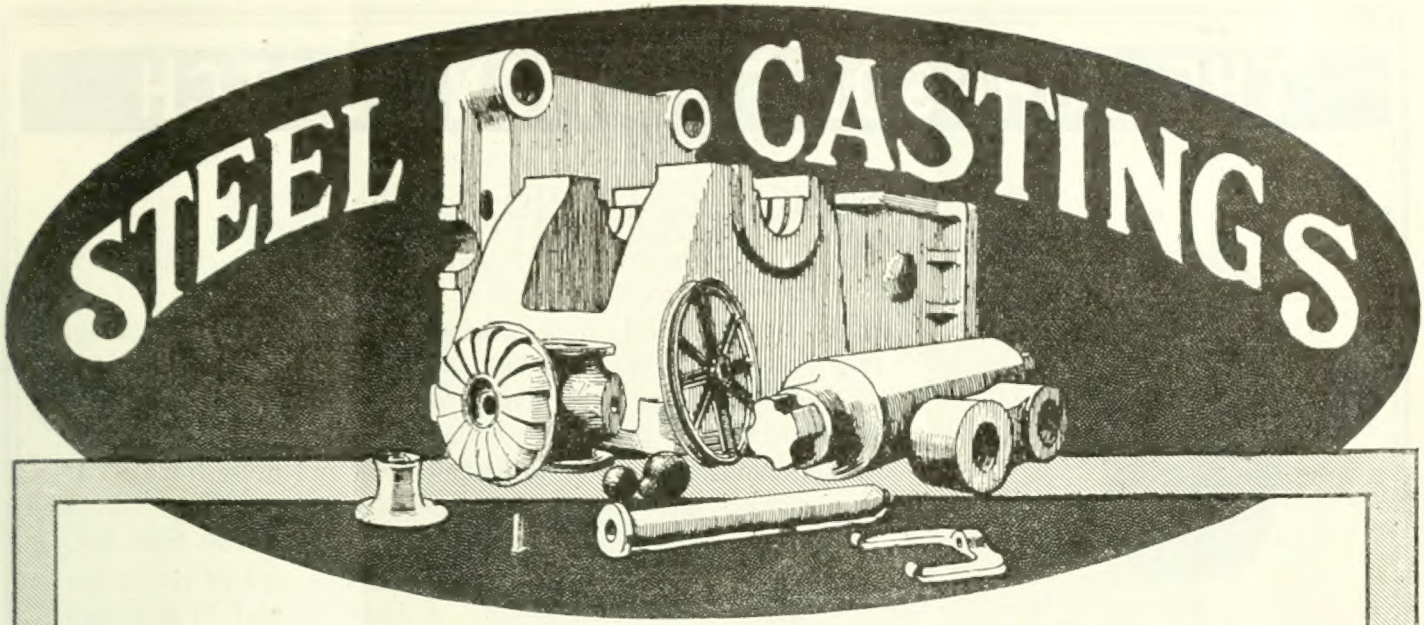
Information and quotations supplied by our Service Department on application.

Deloro Smelting & Refining Co. Ltd.

Head Office & Works—Deloro, Ont.

TORONTO
200 King St. W.

MONTREAL
315 Craig St. W.



Manganese, Vanadium, Titanium, Chrome, Nickel Castings made in sizes from 1 lb. to 50 tons. Made to specifications and true to pattern. You can thoroughly depend on our products.

CANADIAN STEEL FOUNDRIES, Limited

MONTREAL *WELLAND*

H. E. W. Service

Our ability to serve is limited by the demands of your organization. Repair work, special marine repairs, machinery built. Our air chucks which are performing such efficient service in the shell industry is but an evidence of our ability. We have a large and complete staff of expert workmen and thorough equipment. Consult us. We will gladly co-operate with you.

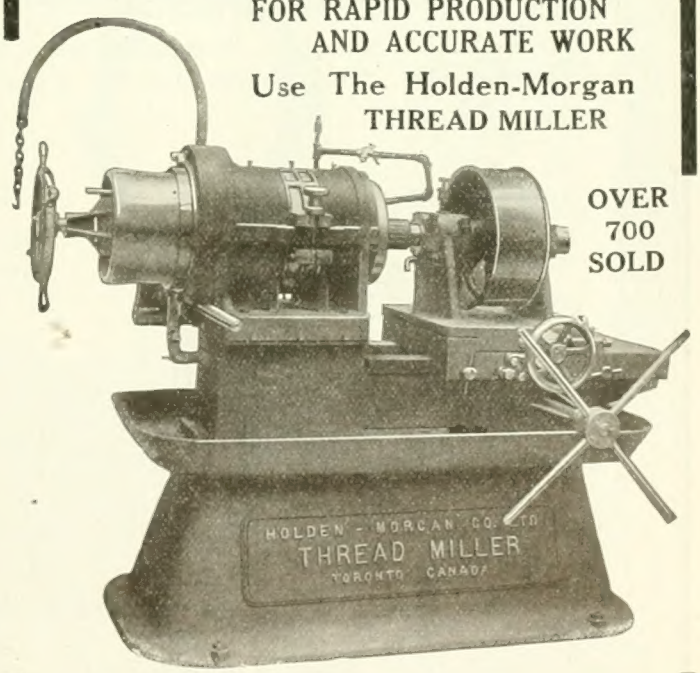
Hyde Engineering Co.

27 William Street
Montreal, Que.

FOR RAPID PRODUCTION AND ACCURATE WORK

Use The Holden-Morgan THREAD MILLER

OVER 700 SOLD



Prompt Delivery

On Nose or Base Machines, also Internal or External Fuse Machines—with air-chucks.

The A. R. WILLIAMS MACHINERY COMPANY LIMITED

64 FRONT ST. W. TORONTO

If any advertisement interests you, tear it out now and place with letters to be answered.

THE JOHNSON FRICTION CLUTCH

SINGLE TYPE

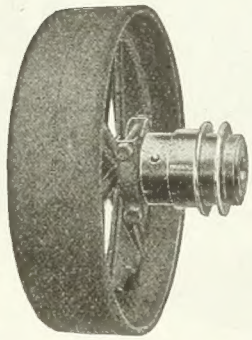


Fig. 1S
Mounted With
Split Steel Pulley

The Johnson Friction Clutch embodies all the principles which make a perfect friction clutch.

It is small, powerful, simple, neat and operates easily and quietly.

Has but few parts, each made absolutely interchangeable. Being nicely balanced, it runs at high speed without vibration. It is round and smooth, with no protruding parts, making accidents impossible.

No bolts, nuts, links, etc., to become loose and cause trouble. It can be instantly adjusted to any tension with one screw.

The working parts being entirely covered are kept free from dirt.

As seen from the illustration in Fig. 2S, this type of clutch has but few parts and is very compact. A body fastened to the shaft carries a split ring in which are inserted a pair of toggle levers. A curve shaped wedge, which is made part of a sliding sleeve, forces the levers apart, expanding the ring, bringing its outer surface into frictional contact with the inner surface of the friction cup, the hub of which is made to suit requirements. The leverage is so compounded that it requires but little pressure to operate the clutch. One screw which moves two taper blocks, set into the levers, adjusts the contact of the ring and cup to any tension. This screw is easily reached with a screw driver through a hole in the friction cup.

The perfectly smooth shipper sleeve entirely covers the working parts so no dirt can get near them.

These clutches have been thoroughly tested before being put on the market. They operate smoothly at any speed without bang or clatter, can be instantly adjusted with one screw, have no projections to catch anything, thus avoiding the accidents so common with ordinary clutches, and save much space by their compactness.

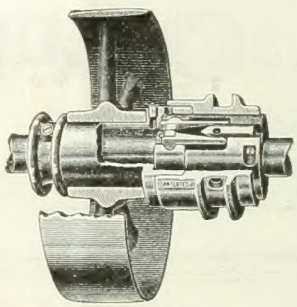


Fig. 2S
Section Broken Away Showing
Clutch-Engaged, Pulley Mounted
On Hub of Friction Cup

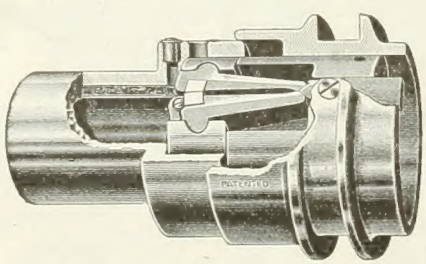


Fig. 3S
Section Broken Away Showing
Clutch Disengaged

In the past several years we have made extensive improvements, which simplify the working mechanism of these clutches, and add to their efficiency, so that to-day we have a product which is the Height of Perfection, and the Acme of Simplicity, in a small, compact clutch.

A trial will convince you, as it has others, that they are the best clutches ever put on the market, for light power within their rating.

Write for our Booklet, "Clutches as Applied in Machine Building" and Yellow Data Sheets.

Canada: Williams & Wilson, Ltd., 320 St. James St., Montreal; Can. Fairbanks-Morse Co., Ltd., Toronto.
England: The Efandem Co., 159 Gt. Portland St., London, W., Sole Agents British Isles.
Australia: Edwin Wood, Pty., Hardware Chambers, 231 Elizabeth St., Melbourne, Victoria.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

We will fill Your Requirements *Send Us Your Inquiries*

Air Compressor Evidence

The greatest evidence of the value of any article is the demand for it after investigation and trial. Below are four carloads of our compressors which fills one order to a large concern in Canada. Our line of compressors is very large.

Write us for catalogue your requirements.

The Jenckes Machine Company, Limited

WORKS: Sherbrooke, Que.

CANADIAN SALES OFFICES: Sherbrooke, Montreal, St. Catharines, Toronto, Cobalt, South Porcupine, Vancouver

WORKS: St. Catharines, Ont.

STEEL *for*

Shrapnel Shells and Shell Blanks

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Office:
New Glasgow, N.S.

Western Sales Office:
Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process

HIGHEST IN QUALITY

NATIONALLY KNOWN

OUR Country requires the extreme limit of production from every lathe, planer, miller or other machine tool.

BE PATRIOTIC

"Red Cut Superior"

The Nationally Known First Quality

HIGH SPEED STEEL

Will enable you greatly to increase your output

"IT'S THE BEST FOR ALL MACHINE WORK"

VANADIUM-ALLOYS STEEL CO.

PITTSBURGH, PA. Works at LATROBE, PA.

CARRIED IN STOCK AT THESE WAREHOUSES

E. F. WARD & SONS, 44 FARNSWORTH ST., BOSTON, MASS. — GEO. MARSH CO., 304 HUDSON ST., NEW YORK, N. Y. — FIELD & CO., INC., 721 ARCH ST., PHILADELPHIA, PA. — VANADIUM ALLOYS STEEL CO., PITTSBURGH, PA. AND LATROBE, PA. — GEO. MARSH CO., 648 WASHINGTON BLVD., CHICAGO, ILL.

We guarantee shipment within 24 hours of receipt of order

"Extra" "Special" "High Speed" Tool Steels

SISCO

Made in Sweden from selected Dannemora Ore

We also carry in stock Solid and Hollow Drill Steel, Die Blocks, "SISCO" Welding Wire, Drill Rod and Swedish Iron.

Swedish Steel & Importing Co., Ltd.

MONTREAL, QUE.

TRADITION

We have a great tradition to perpetuate. The British-made file has always been the standard of file efficiency. It has always had better steel in it, quicker cutting teeth, and been harder and straighter than the files of other nations. That is unchallenged the world over.

Founded on an ideal—the production of Canada's Finest Files—this corporation is entirely Canadian, therefore all-British, and our whole organization is saturated with the maxim—

QUALITY FIRST

P H

TRADE MARK

Quality Files

CANADA'S STANDARD

Made in Canada, by Canadians, for Canadians.

ARE YOU FILE-WISE?

PORT HOPE FILE MFG. CO., LIMITED

Port Hope, Ontario

"Ask your jobber"

TEXTILE BELTING and PACKINGS

J.R. BAXTER & COMPANY LIMITED, MONTREAL.

HIGH SPEED TWIST DRILLS

and GENERAL MACHINERY SUPPLIES

"ULTRA CAPITAL" HIGH SPEED STEEL

Balfour's Tool Steel

"CAPITAL" HIGH SPEED TWIST DRILLS

MANUFACTURED BY

Arthur Balfour & Co., Limited

Dannemora Steel Works,
Sheffield, England.

The Eagle & Globe Steel Company, Limited

Head Office and Warehouse, Canada and U.S. — 128 Craig Street West, Montreal
Ontario Office and Warehouse — 36 Colborne Street, Toronto
Winnipeg Stock — Dominion Equipment & Supply Co. Limited
Vancouver Stock — Frank Darling & Co.

W. A. BRADBURY, Agent, 128 Craig Street West, Montreal

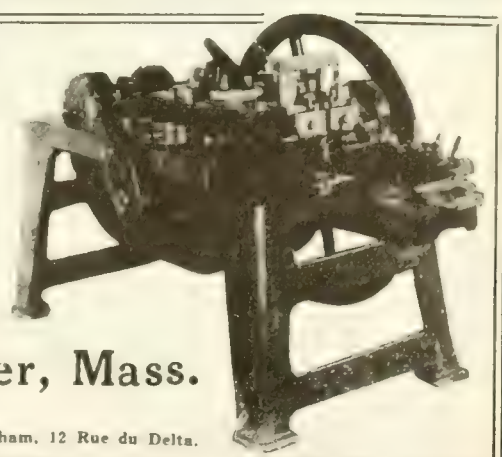
MAKE NAILS! NOT NOISE!

We offer the trade new types of

WIRE NAIL MACHINES

QUIET IN OPERATION; WITH VERY HIGH OUTPUT; ALL PARTS ACCESSIBLE; DECREASED MAINTENANCE COSTS; GREAT CAPACITY; OCCUPYING SMALL FLOOR SPACE.

Smoothly running machines, with balanced mechanical motions and no rotating cams. Built in 5 sizes, handling wire from No. 17 to 3/8" diam.



PRACTICALLY NOISELESS IN OPERATION

Sleeper & Hartley, Inc., Worcester, Mass.

CANADIAN BRANCH, COATICOOK, P.Q.

London, England, F. A. Perry, 63 Queen Victoria Street, E.C. 4. Paris, France, Edgar Bloxham, 12 Rue du Delta.

FERRO-URANIUM *The Latest Discovery in Alloys for Efficient*

High-Speed and Other Steels of Quality

IT INSURES TOOLS THAT STAND UP ON THE JOB

Largest Producers in the World of URANIUM

WRITE US FOR PARTICULARS

STANDARD ALLOYS COMPANY

Forbes and Meyran Aves. -:- Pittsburgh, Pa.

Electrite

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium—make this a steel of truly remarkably cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.

LATROBE, PA.

High Speed Steel

Uranium

High-Speed STEEL

The tools that are made with "Wolfram" High Speed Steel are warranted to be super-keen at the edge and super-strong at the neck.

WOLFRAM

Embodies a true and permanent alloy of Tungsten, Chrome, Vanadium and Iron. No better High Speed Steel in the world.

VULCAN CRUCIBLE STEEL COMPANY

ESTABLISHED 1900

Aliquippa - Pa., U.S.A.

Represented in Canada by Messrs. Norton, Callard & Company, Montreal.

Roelofson 6-in. Banding Machine

YOU couldn't imagine a more sturdy, compact, serviceable machine than this! A glance at the illustration will show you for yourself. It has been used in Canadian munition plants since the munition business started, and is still giving absolute satisfaction. It's the machine you need if you make shells.

Look over the following outstanding features of its construction:

Integral (en bloc) construction assures perfect rigidity, permanent accuracy and desirable compactness.

Chucking with spring collet chuck insures accurate and speedy checking.

Graduated feed dial, two cutting tools, and ample belt power insure output of accurate work in least possible time.

Machines are built for 15, 18, 60-pdr. and 6" shells.

Roelofson Machine & Tool Co., Ltd.

Head Office 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse: Galt, Ont., Canada

Immediate Delivery

To shell plants changing over from the manufacture of the larger sizes to 6" shells, our ability to make **immediate delivery** should be of especial interest.

And remember that the Roelofson is one of the few banding machines that have stood up from the first of the munition game and are still doing duty.

If any advertisement interests you, tear it out now and place with letters to be answered.

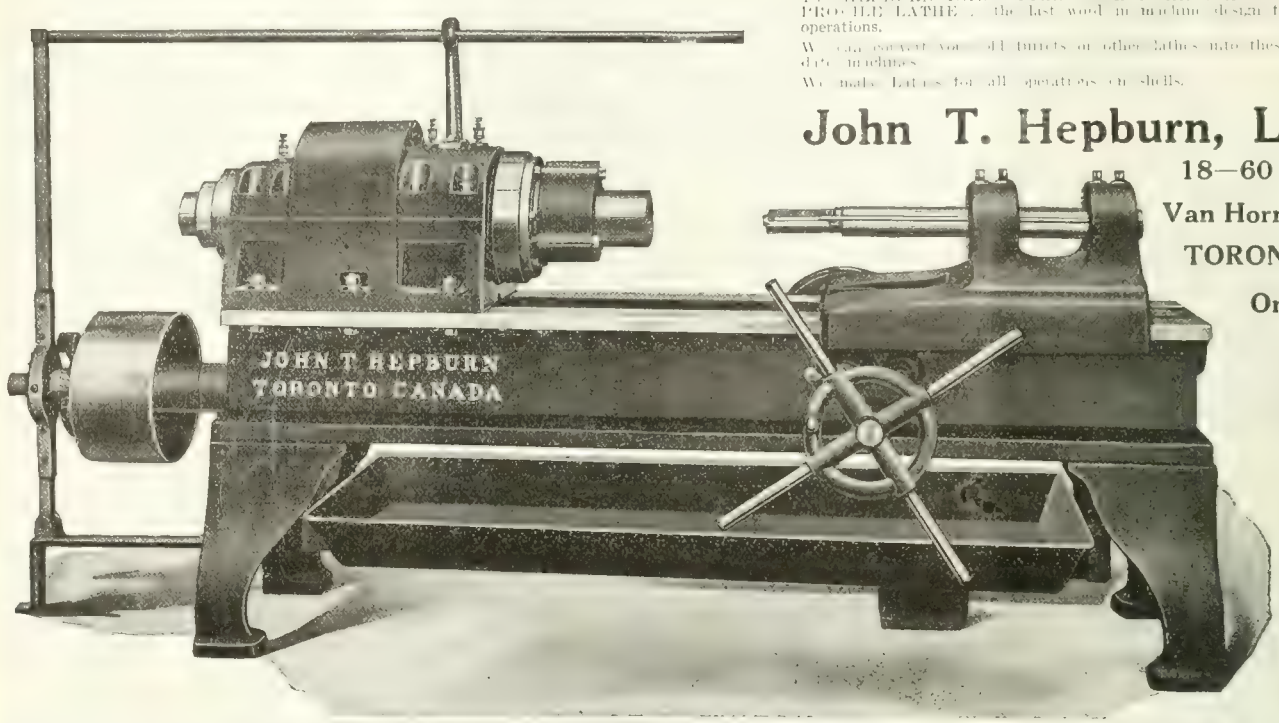
Into the Driving Gears— Strength

This HEPBURN Single Bar Boring Lathe's rigid construction has proven it to be the BEST 6" BORING LATHE procurable.

The HEPBURN NEW STYLE NOSE BORING AND INSIDE PROFILE LATHE is the last word in machine design for these operations.

We can convert your old turrets or other lathes into these up-to-date machines.

We make Lathes for all operations on shells.

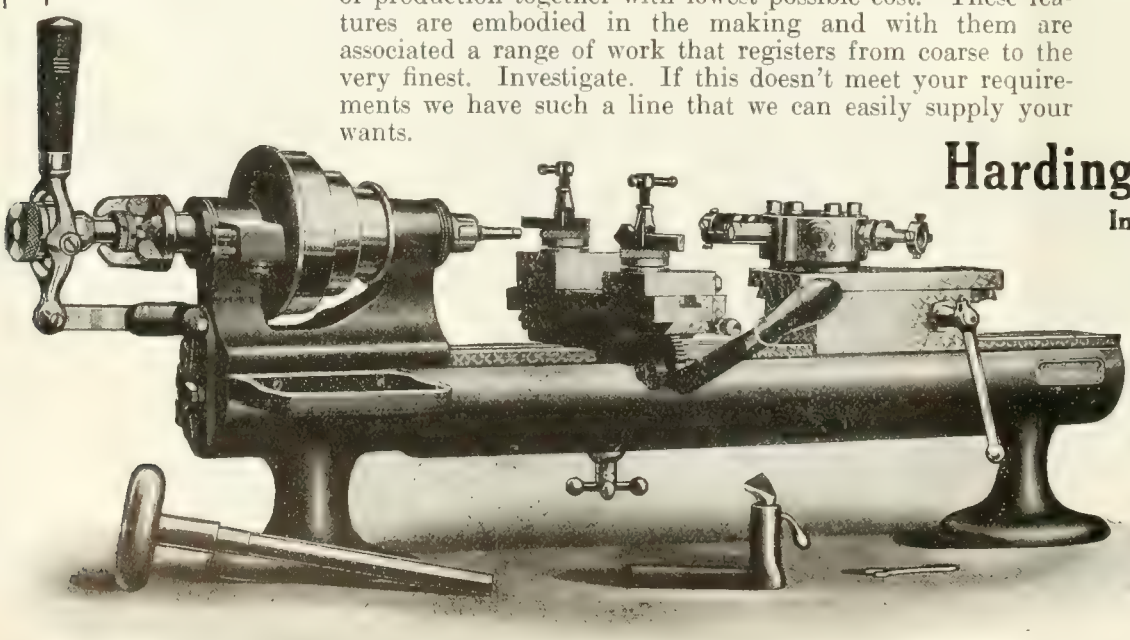


John T. Hepburn, Ltd.

18—60
Van Horne St.
TORONTO
Ontario

If it is a Question of Efficiency

There are lathes that will give you all grades of efficiency. But we interpret efficiency to mean highest speed and quality of production together with lowest possible cost. These features are embodied in the making and with them are associated a range of work that registers from coarse to the very finest. Investigate. If this doesn't meet your requirements we have such a line that we can easily supply your wants.



Hardinge Bros.
Inc.

1770 Berteau Avenue,
CHICAGO,
ILL., U.S.A.

THE BANFIELD PLUG MILLER

Patented in Canada and United States

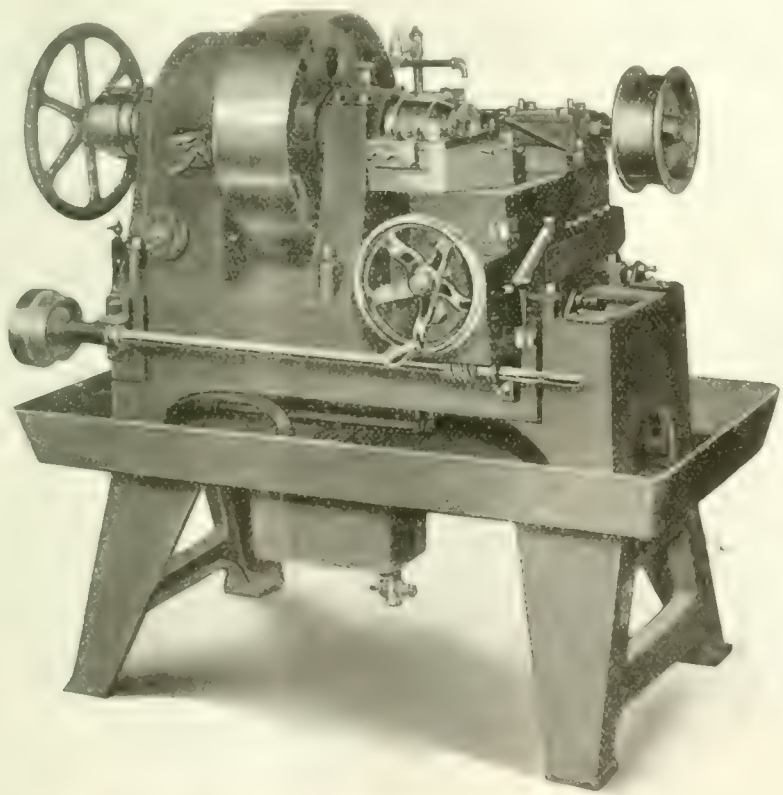
THE COMPLETE PLUG FINISHED IN SIX MINUTES BY UNSKILLED LABOR

A machine especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired and milling the thread—*all in one chucking.*

One man can operate two machines, considerably reducing your cost per plug.

The Banfield Plug Miller is equipped with quick draw in collet.

Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio with jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds), having automatic stop. Power feed pump with relief valve driven from worm shaft (all drives direct from main line shaft). Rigidly built; simple and economical to operate.



For Turning and Milling the Thread on Gas Check Plugs for 6-inch High Explosive Shells

Weight 1800 lbs.

For 18-pdr., 4.5 and 60-pdr. High Explosive Shells. Can furnish machines of same type, weighing 1250 lbs. Particulars on request. These machines are tooled up for finishing plain machined or bevel plugs if desired.

BASE PLUGS

Machined to Government Specification

Have in stock for immediate shipment machined base plugs for 4.5, 60-pdr., and 6" High Explosive Shells, either threaded or beveled.

Machine work subject to acceptance of Government inspector at your plant.

Capacity 4,000 per day. Write for prices.

EDWIN J. BANFIELD

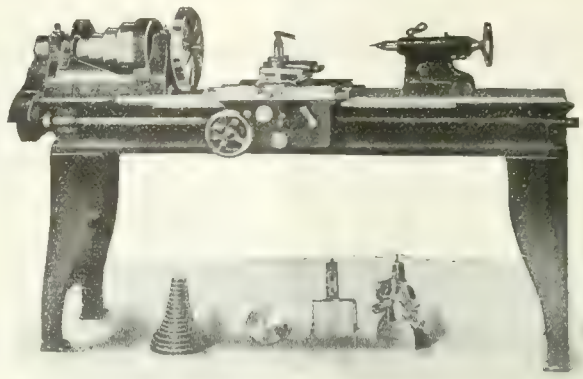
STAIR BUILDING - - TORONTO, ONT.

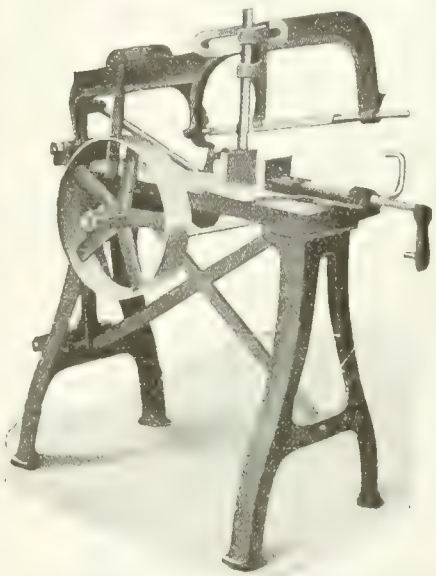
The "McKenzie" Engine Lathe

The Standard of Accuracy

Made from new patterns, of improved design, and constructed of the very best material by expert workmen. Every part is mechanically perfect and excellently finished. Its accuracy and durability mean a big saving of money to you.

Let us put full details before you. Write!





The Improved Power Hack Saw

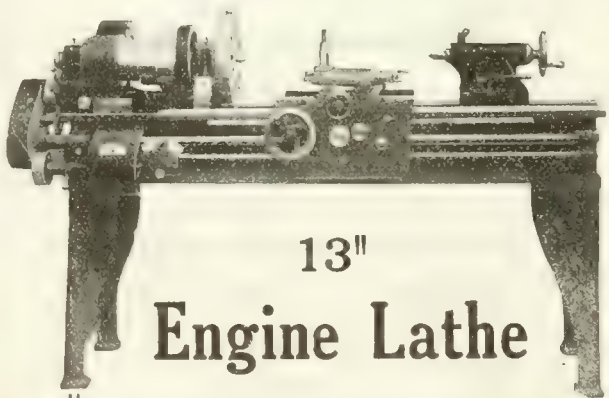
will cover its cost many times over with the money it saves through long, efficient service.

Saws bars 6 x 6 in., either round or square, and is so constructed as to require no attention after work is put in vise, and stops automatically when piece is cut off.

The Improved Saw Guide is a Special Feature — it keeps the saw perfectly in line at all times.

The D. McKenzie Machinery Co.

Guelph, Ontario



13" Engine Lathe

Such features as solid, full-webbed headstock, 50 point carbon crucible steel spindle, rigidly clamped tailstock and an unwavering principle to maintain a standard of machine that is proportionate throughout and conforms to the requirements of "Filsmith Quality."

These features have put this lathe in the foreground, where its daily performances keep it.

Inquire of us. It is a pleasure to help you.

The Philip Smith Mfg. Co.
SIDNEY OHIO U.S.A.

PRACTICALITY

AFTER fifteen years' study of the Miner's and Lumberman's wants, we know just what is and what is not required in tools for them.

Practicality has been the keynote of our organization. Experience has aided us in eliminating all unnecessary parts and in perfecting the design of our tools.

The use of best material and finest workmanship enable us to manufacture tools that are unexcelled.

We make a complete line.

Write us for prices.

J. W. CUMMING & SON, LTD.
NEW GLASGOW, - - CANADA

Wood or Steel, let Cummings make it.

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

Two Cuts at One Time

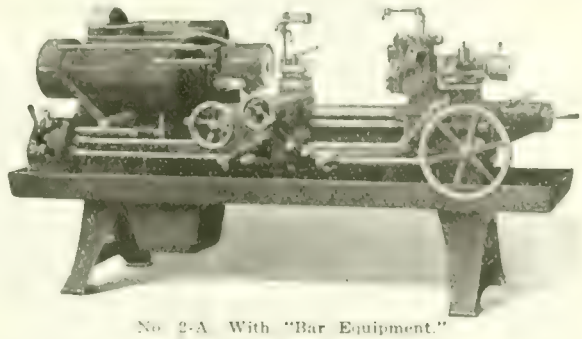
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

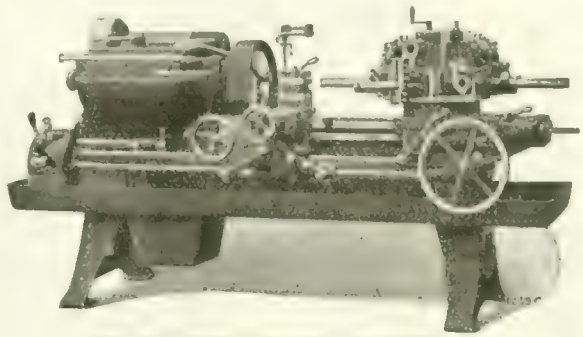
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A With "Bar Equipment."



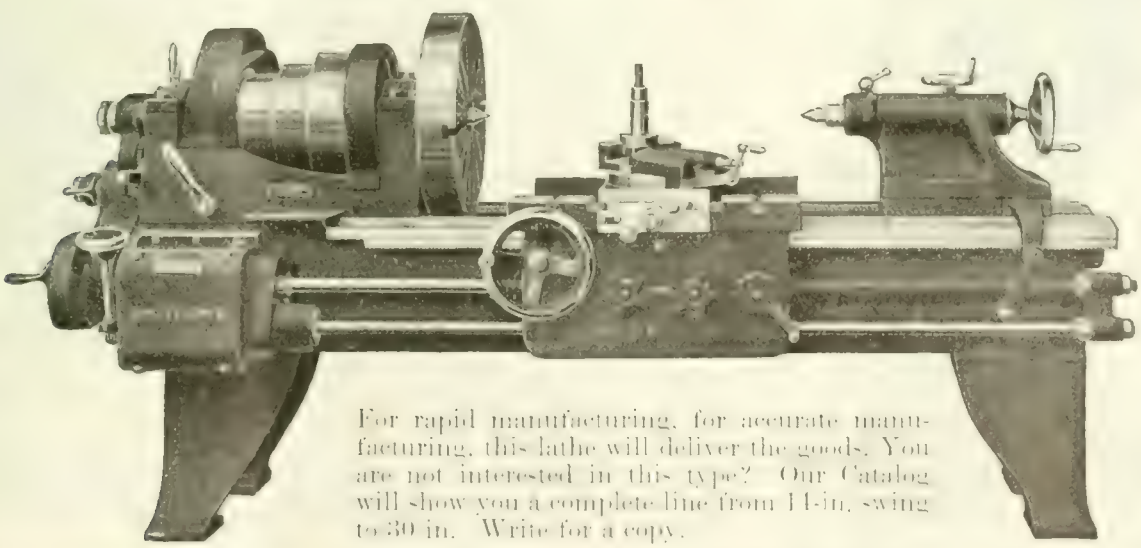
No. 2-A—With "Chucking Equipment."

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal, Benson Bros., Sydney and Melbourne, Australia; A. Asher Smith, Sydney, Australia

For Manufacturing—

This 20 in. Whitcomb-Blaisdell Lathe



For rapid manufacturing, for accurate manufacturing, this lathe will deliver the goods. You are not interested in this type? Our Catalog will show you a complete line from 14-in. swing to 30 in. Write for a copy.

LATHES From 14" to 30" SWING

WHITCOMB-BLAISDELL MACHINE TOOL CO.
WORCESTER, MASS., U.S.A.

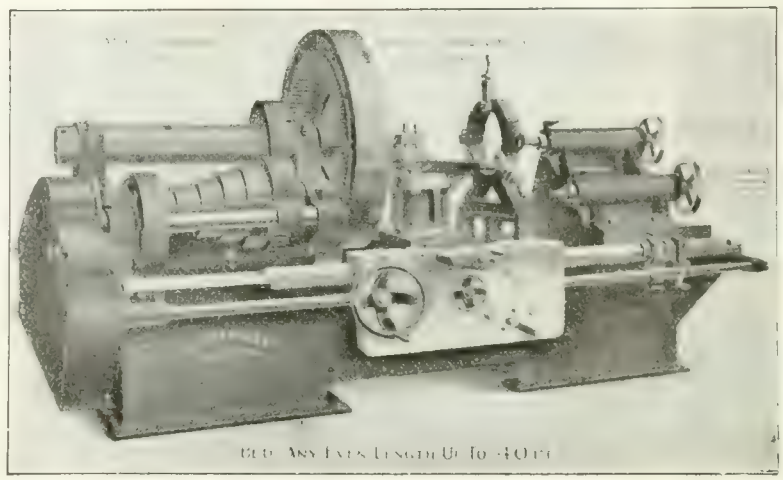
PLANERS From 17" to 48" WIDE

IMMEDIATE SHIPMENT

30-ft. BED
McCabe 2-in-1 Lathe

26 and 48-INCH SWING
TRIPLE-GEARED—RATIO 72 to 1

J. J. McCabe, 149 Broadway New York



Showing McCabe's Latest Heavy Type "2-in-1" Double-spindle Lathe—26 48-in. Swing.

48-in Swing. Triple Geared — ratio 72 to 1.

26-in. Swing. Back-geared.

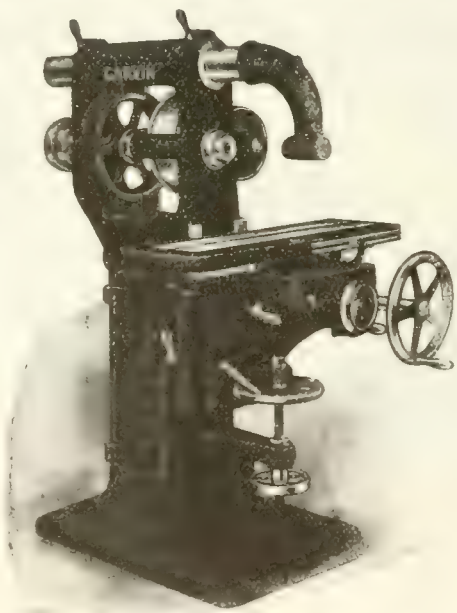
Turns between centers—24 ft.

Swing over carriage on 48-in. Lathe is 40 in.

Prominent shipbuilders are using McCabe Lathes on long beds.

Thousands in operation all over the world.

GARVIN No. 21 Plain Miller



No. 21 B.G. PLAIN MILLING MACHINE
Back Geared
Use Code - Abject

Back Geared

For Plain and Gang Milling for general manufacturing, and is used mostly in gangs of 5 or 6 machines to one operator. Spindle runs in adjustable bronze boxes, and is driven by a 3" belt through back gears (3 to 1).

Knee is our improved solid top design, rigid and stiff to resist side pressure of heavy cuts.

DIMENSIONS:

Automatic Feed at Table	18 in.
Adjustment in line with Spindle	6 in.
Vertical adjustment under Spindle	13 in.
Table, inside Oil Pockets	6 x 10 in.
Ranges of Speed	6
Changes of Feed	6
Net Weight, Skidded	1,575 lbs.

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

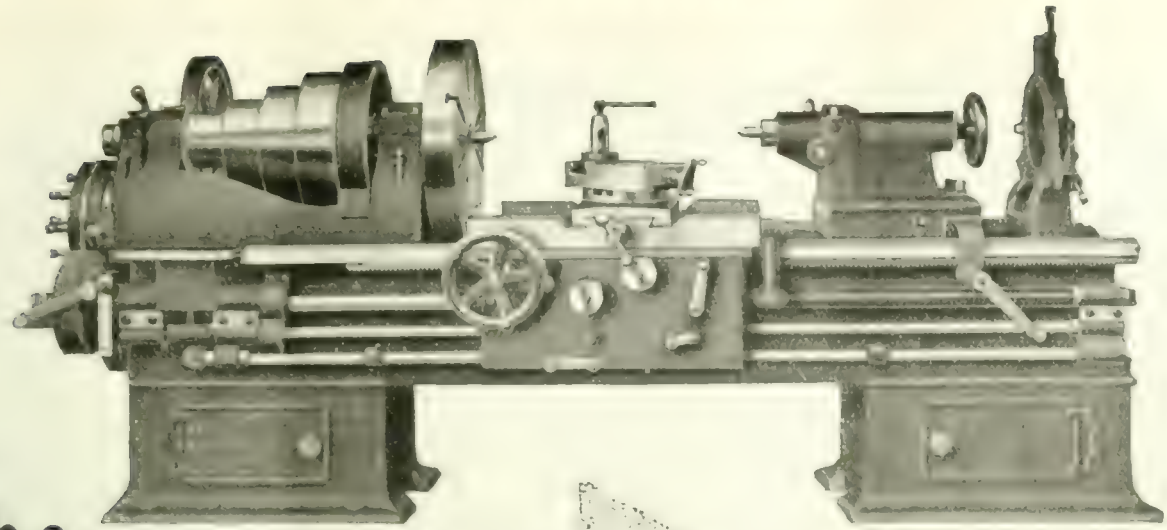
IMMEDIATE DELIVERIES

Send for Complete Catalog

MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) **50 Years New York City**



The "HAMIL TON"

Speeds Production

INSTALL the most modern machinery in your plant to meet the new conditions of to-day. You get it in Hamilton Lathes.

We are living in the greatest speed-up, cut-the-cost-of-production period of modern times. War time conditions demand speed and economy in the machine shop as well as in other institutions of commerce. Shops everywhere are now producing more work with the same force of men than before the war. The war has created a demand for the utmost efficiency and brought out the resourcefulness of the country in new machinery.

Hamilton Lathes represent the conditions in the machine shop and the spirit of the times with their speed, durability and accuracy.

Write now for Bulletins—yours for asking.

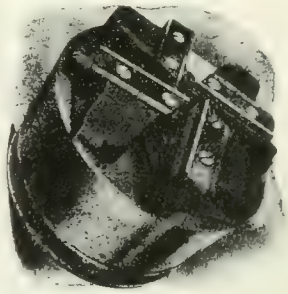
The Hamilton Machine Tool Co.

HAMILTON, OHIO

Sole Agents for Ontario:

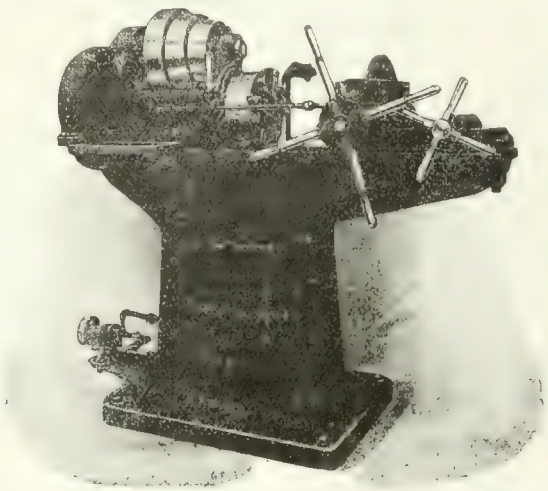
H. W. PETRIE, Limited - TORONTO, ONT.

Landis Threading Method Means Less Labor



AS labor becomes scarce and wages increase, industry requires the most efficient and most economical machine for every line of work.

Meeting that condition in regard to thread-cutting is the **Landis Threading Machine** or **Die Head** for bolt, pipe and special threads. The Landis Die can be used advantageously for cutting every thread in your shop. No matter what form of thread, pitch or shape of the part to be threaded, the Landis will handle it to your complete satisfaction. Many threading jobs which were formerly done on lathes are now threaded with a Landis die head or machine and the results are **equal accuracy, a higher production** and **a lower threading cost.**



One customer writes:—"We have made an increase in production of 30 to 40% and a savings in the cost of chasers of 50 to 60% since installing your machine."

Does not that prove the efficiency of the Landis Threading Method?

Write for catalogues.

No. 22—Bolt Threading Machinery.

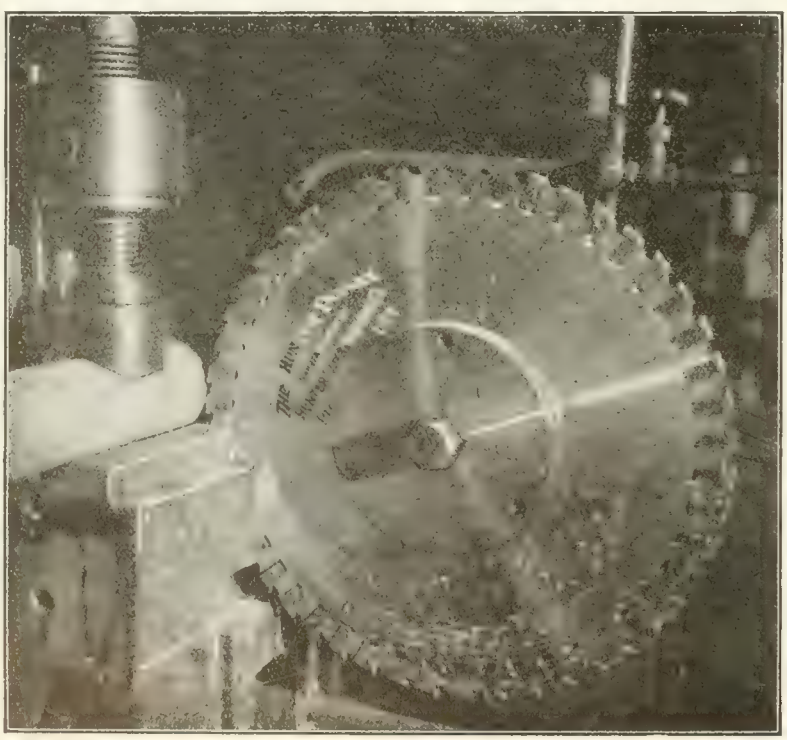
No. 23—Pipe Threading Machinery.

Landis Machine Company

WAYNESBORO, PA.

Exclusive Canadian Agents: Williams & Wilson, Limited, Montreal

A Hunter "Duplex" on Shrapnel Stock



FAST GOING
on Newton Machine

Through 3½" round 60 Carbon, 70 Manganese Shrapnel Stock every

2 MINUTES

The secret of Hunter "Duplex" Saw speed is the method of holding the high speed teeth.

You can use this speed profitably — on shrapnel or any other stock.

Let us send full Particulars.

HUNTER SAW & MACHINE COMPANY, Pittsburg, Pa.

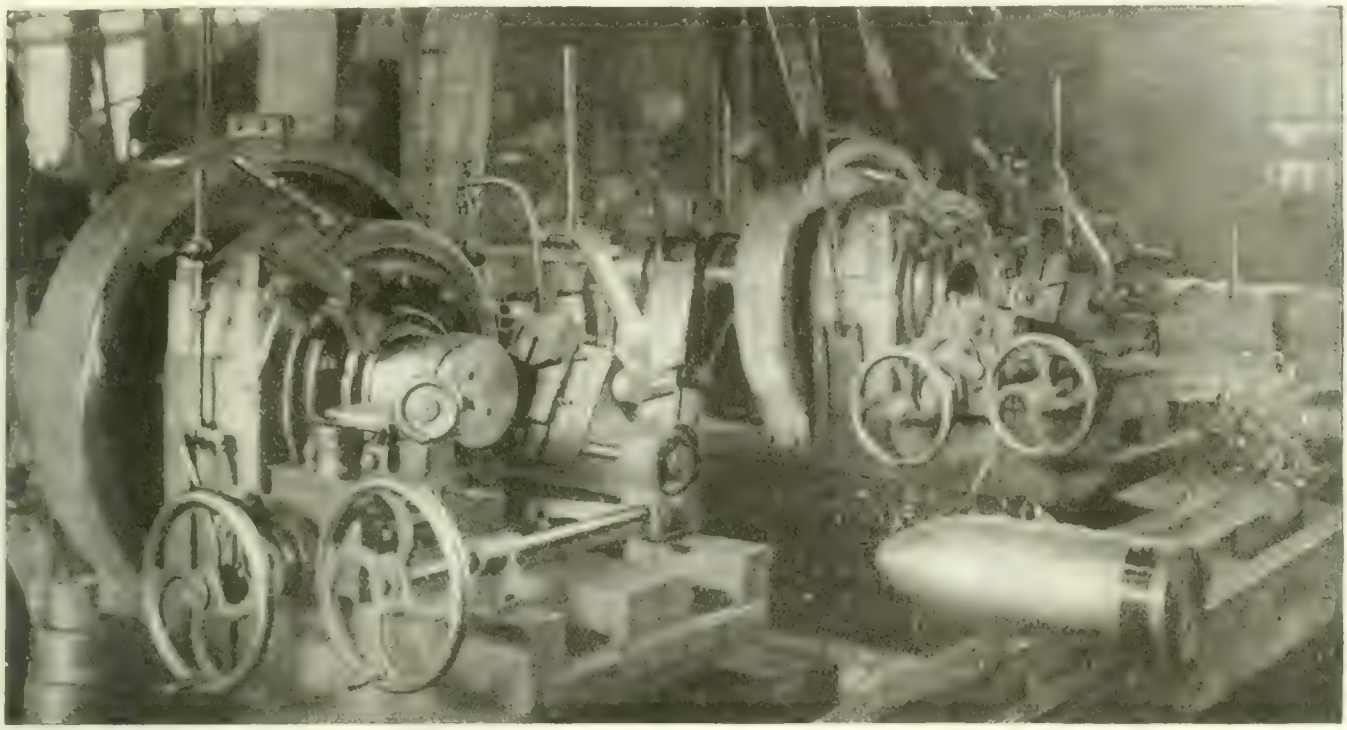


Photo shows two of our Band Turning Machines in one of the largest shell shops in Canada.

These machines are built for turning bands on 8" 9.2" and 12" shells. They are giving perfect satisfaction in several of the largest 9.2" shops in Canada. Let us put you in touch with some of them. **Write for full particulars and price.**

Bennett Ave. **Warden King Limited** Maisonneuve, P.Q.

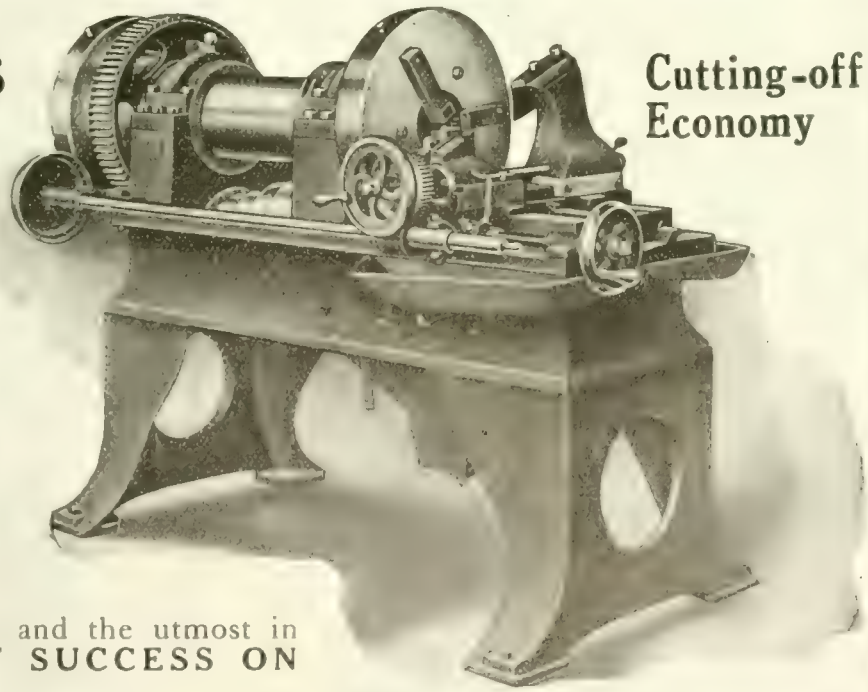
Two Cuts Simultaneously

One up, the other down. This is what makes the **Hurlbut-Rogers Cutting-Off and Centering Machine** virtually double the output and reduce the cost per piece about one-half.

The Hurlbut-Rogers Machine gives you capacity of two machines at the expense and in the floor space of one machine.

We build them for hard work and the utmost in accuracy—and their **GREAT SUCCESS ON SHELLS** shows it.

Let us go into details.



Cutting-off Economy

5-inch Cone-Driven Machine

HURLBUT-ROGERS MACHINERY CO., South Sudbury, Mass.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne. H. W. PETRIE, TORONTO, CANADA.

If any advertisement interests you, tear it out now and place with letters to be answered.

THE Crank Shafts of all Consolidated Presses are made from .50 to .60 carbon steel hydraulic forgings, accurately machined and ground to size. The body bearings are carefully scraped to fit, thus insuring a perfect bearing.

The Crank Pins are larger in diameter than the main bearings. This has always been a Consolidated feature. Crank cheeks are liberal and guarantee strength and rigidity in the shaft; this, together with the enlarged crank pin, materially resist torsion when the press is in operation.

You cannot ignore these features.

Consolidated Press Company

HASTINGS *LARGEST EXCLUSIVE MANUFACTURERS OF POWER PRESSES IN U.S.A.* MICHIGAN

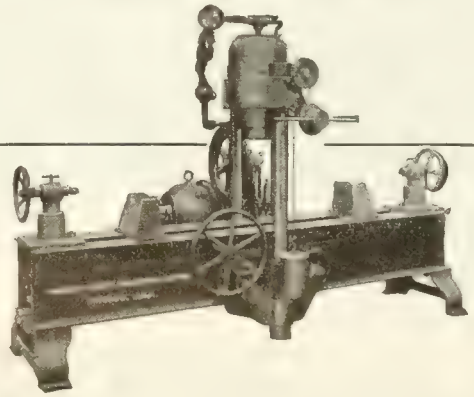
Canadian Representatives: A. R. WILLIAMS MACHINERY CO., Limited, Toronto, St. John, Winnipeg, Vancouver

ELMES

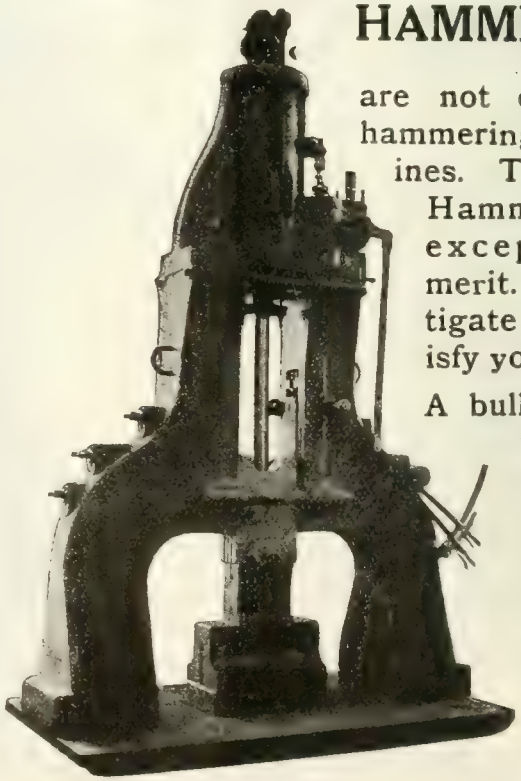
Motor Driven Straightening Press for shafts up to 5 in. Movable head, height adjustable, close regulation of action, strong screw centre parts. One of our many types.

Charles F. Elmes Engineering Works.

217 N. Morgan St. Chicago, U.S.A.



"ERIE" STEAM FORGING HAMMERS



are not ordinary hammering machines. They are Hammers of exceptional merit. Investigate and satisfy yourself.

A bulletin for the asking.

ERIE FOUNDRY COMPANY
ERIE, PENNSYLVANIA, U. S. A.

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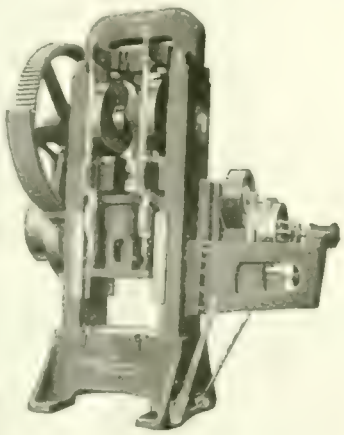
THE "TOLEDO"

Straight Column Double Action Cam Drawing Presses

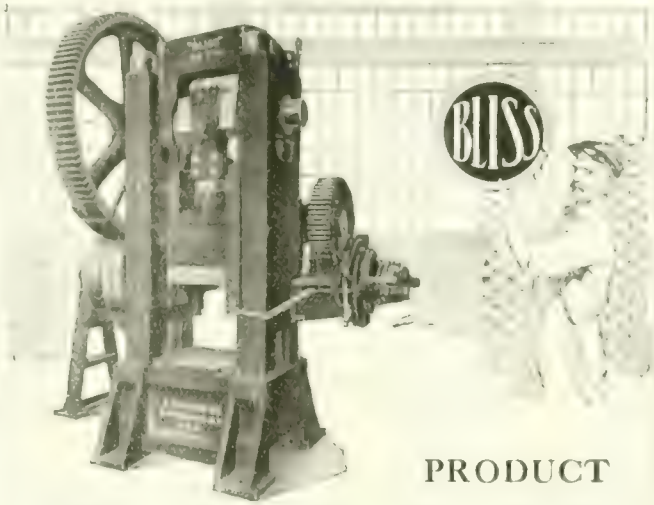


For cutting and drawing in one operation cups and shells made from heavy metal.

For economy and rapidity of production automatic feeds and auxiliary devices may be attached.

These presses are of the highest grade construction throughout to make for long service and low upkeep, and the most advanced ideas are embodied in the design.

The Toledo Machine & Tool Co.
TOLEDO, OHIO



BLISS

PRODUCT

"Getting it out—and right" goes further back than the selection of the machine. It may go back 10 or 20 or 40 years to some point or problem solved in our 60 years' development of Presses that produce.

If you want machines with product on capacity based on [illegible] practical experience, buy "Blis."

BLISS E. W. BLISS CO. BLISS
Brooklyn, N.Y., U.S.A.
1857 1917

CHICAGO OFFICE People's Gas Bldg
DETROIT OFFICE Dime Bank Bldg
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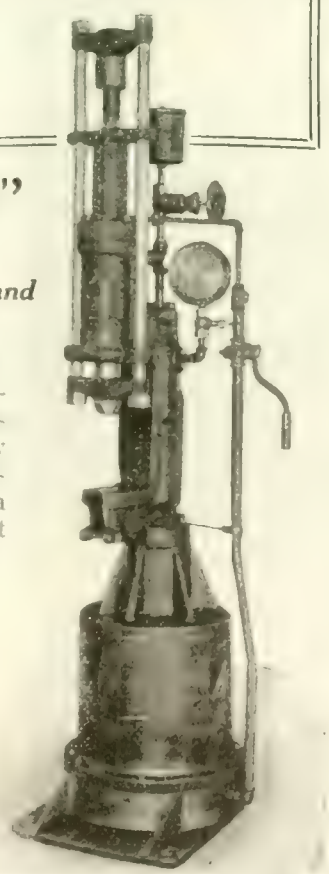
Triple Purpose

"METALWOOD"

COMBINATION

Forcing, Broaching and Straightening Press.



Its value is in the many uses to which it is adaptable. Auxiliary tables and fixtures add greatly to its usefulness. It is not "encumbered" with a single excess part. Built for production.

Metalwood Mfg. Co.
Leib & Wight Sts.,
DETROIT, MICH.
U.S.A.

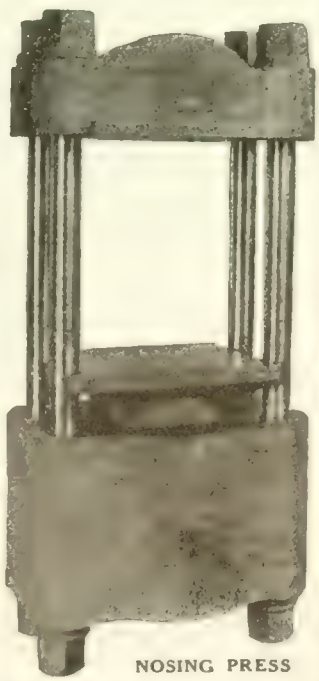
For Great Britain and Continent address Gaston E. Marbaix, Coronation House, 4 Lloyds Ave., London, E.C., England.

PRESSES

Pumps and Accumulators

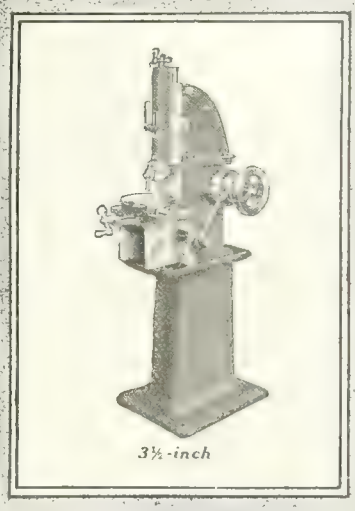
FOR ALL PURPOSES

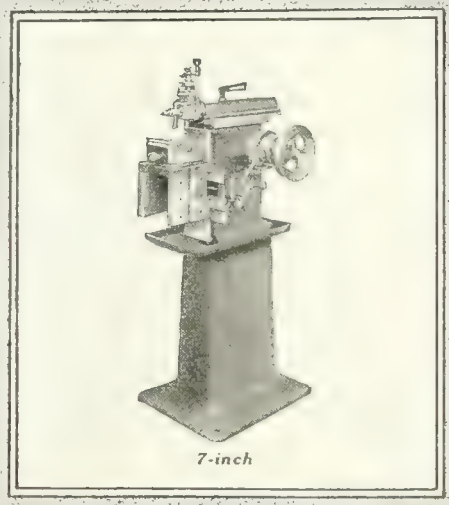
Made in Canada

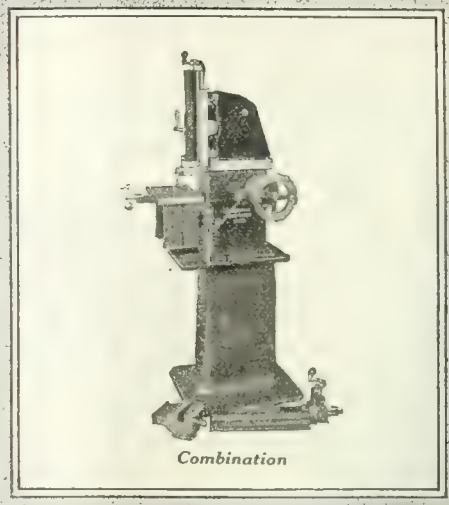


NOSING PRESS

WILLIAM R. PERRIN, Limited
TORONTO


3½-inch


7-inch

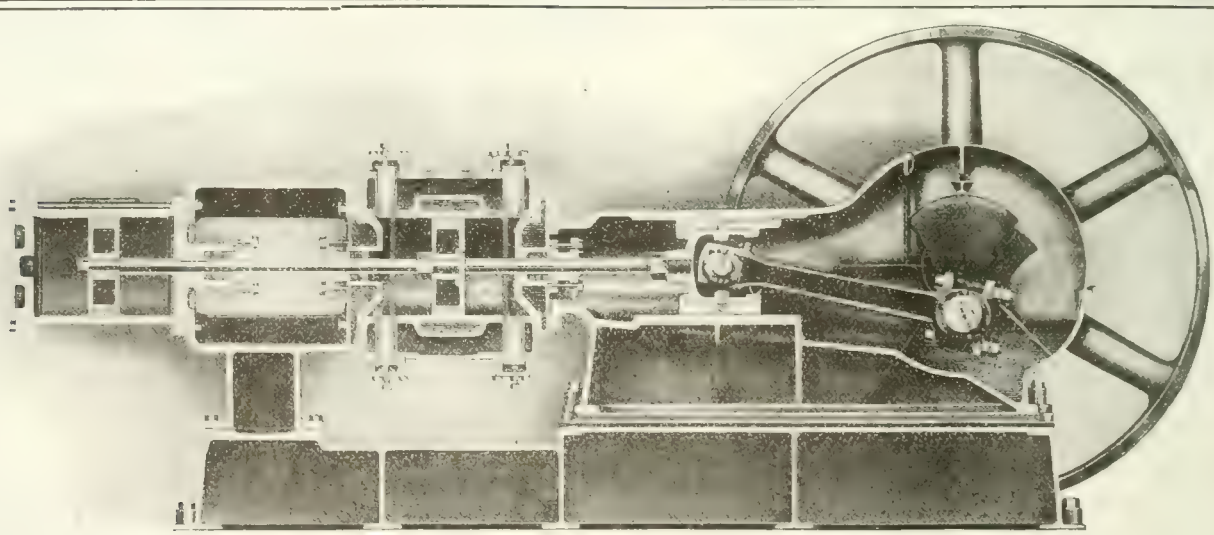

Combination

Three of the machines that by their cost-reducing features have established themselves "solid" with the home users and by these same merits are reaching out in foreign countries. A silent, but powerful message of the Rhodes efficiency.

Their capacity is greatly promoted by the adjustments which may easily and quickly be attached. For shaping, slotting, die making, tool making, etc., these machines stand paramount. An inquiry on your stationery will receive prompt attention.

The Rhodes Mfg. Company

Hartford, Conn., U. S. A.



Sectional view of "FL-1" Steam Driven, Single Stage, Straight Line Air Compressor

This view shows the simple, compact construction of this class of compressor. Thorough lubrication and thorough water-jacketing are strong features of this machine.

The location of the steam cylinder enables the machine to be readily converted to belt drive should conditions require it, by disconnecting the valve gear and removing the steam piston. If necessary later on, the machine may be changed back to the steam-driven type. Bulletin K-302 describes the machine fully. Write our nearest branch.

CANADIAN INGERSOLL-RAND COMPANY, LIMITED

COMMERCIAL UNION BUILDING

MONTREAL - - CANADA

Branches: SYDNEY SHERBROOKE MONTREAL TORONTO COBALT TIMMINS WINNIPEG NELSON VANCOUVER

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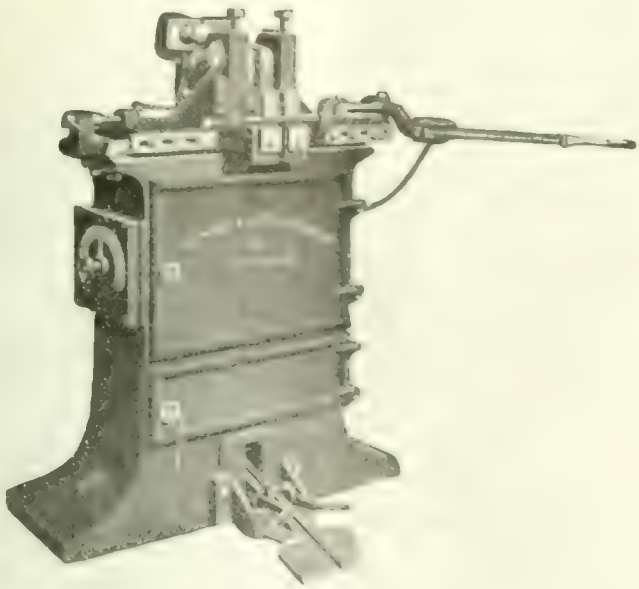
Thomson Process
Electric Welding

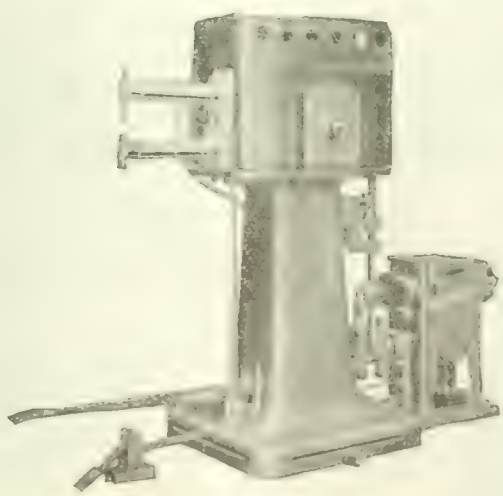


Adopt a "Thomson" For Your Work

We have shown thousands of manufacturers how to lower their costs and obtain better production by the use of Thomson Butt Welding Machines. No doubt there is work in your shop that could be handled faster and better by the "Thomson" Electric Welding Process.

Why not talk it over with us—let us give you actual facts on how we have saved other firms money and how we can benefit you? It costs nothing for this consultation. Get in touch with us to-day.

Write for Bulletin B-4.



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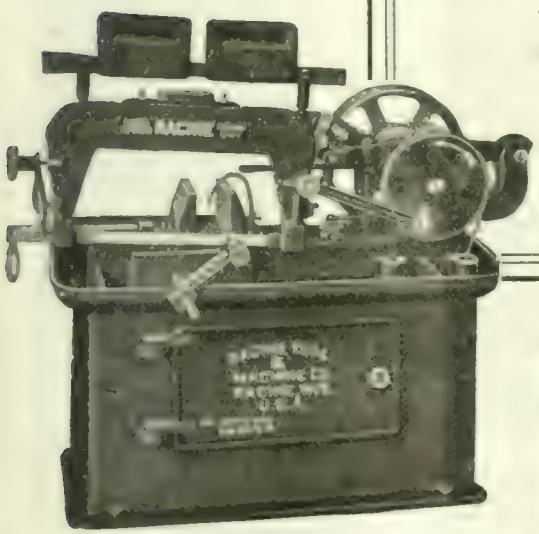

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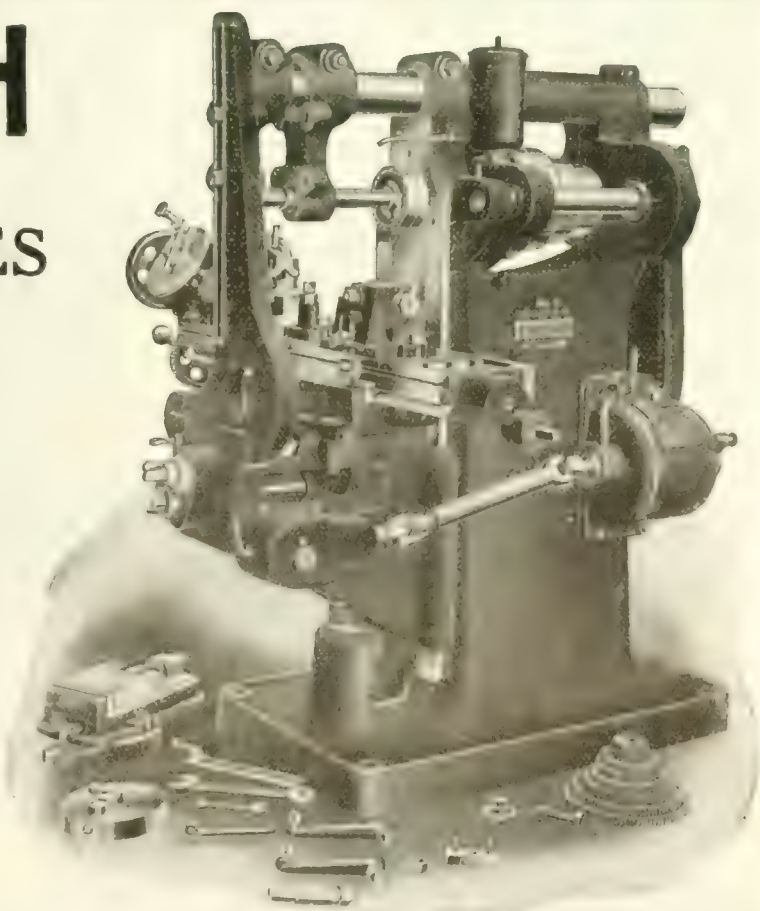

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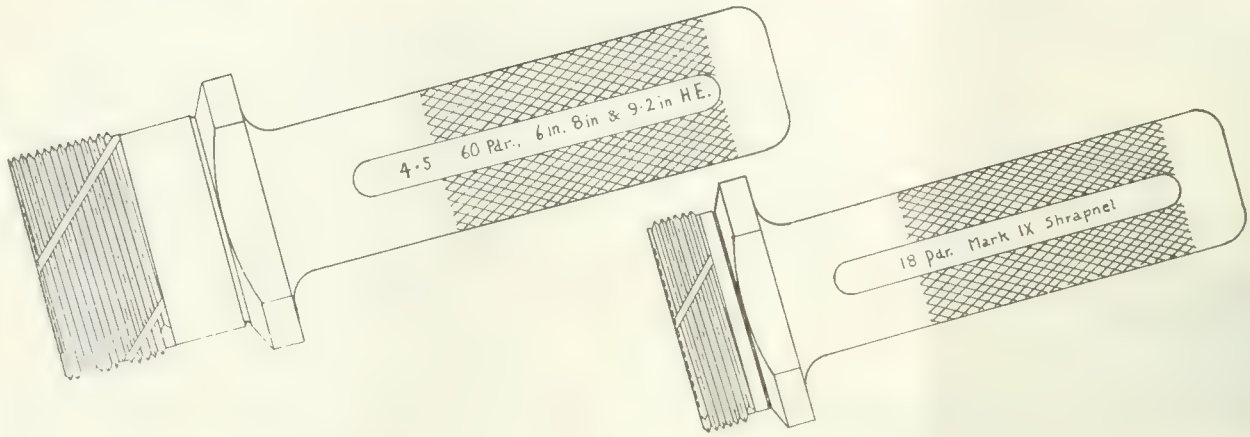

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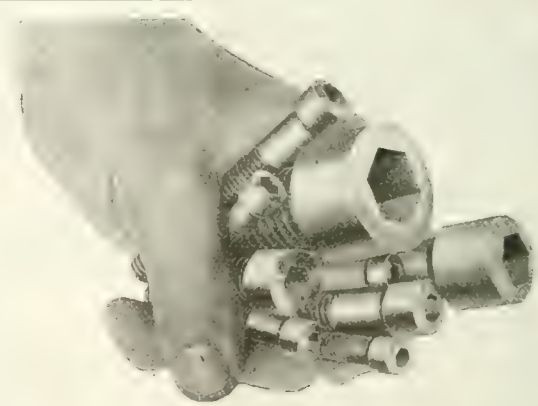

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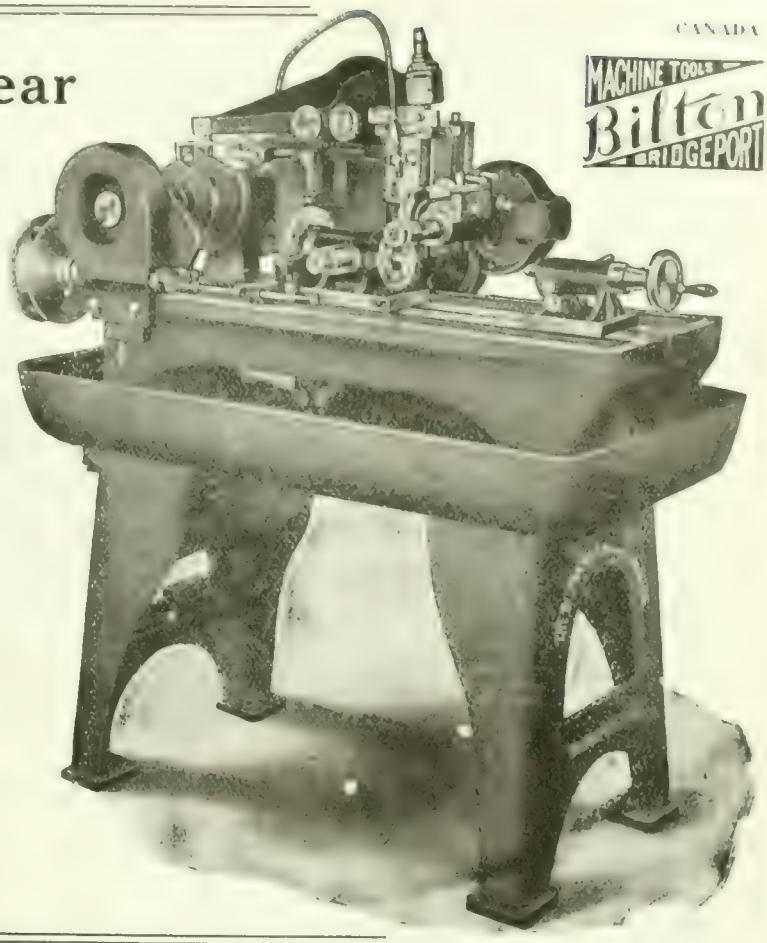

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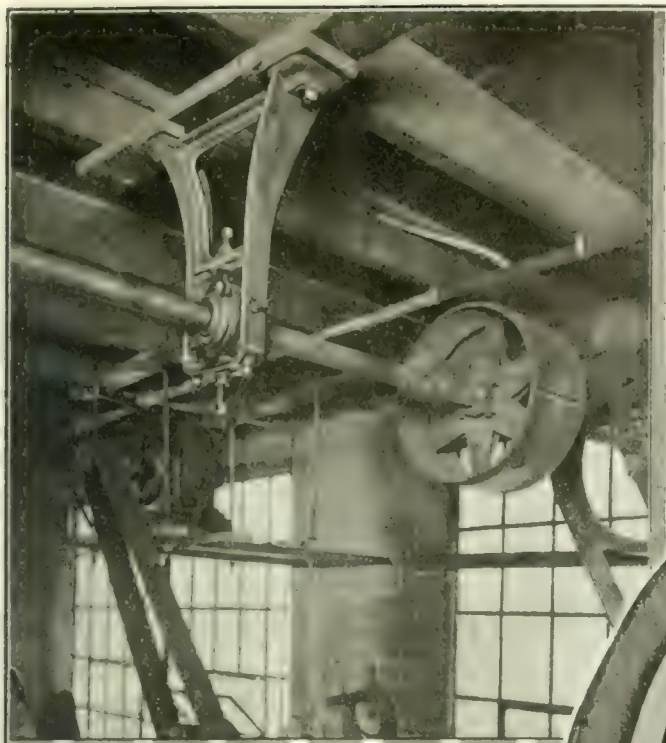

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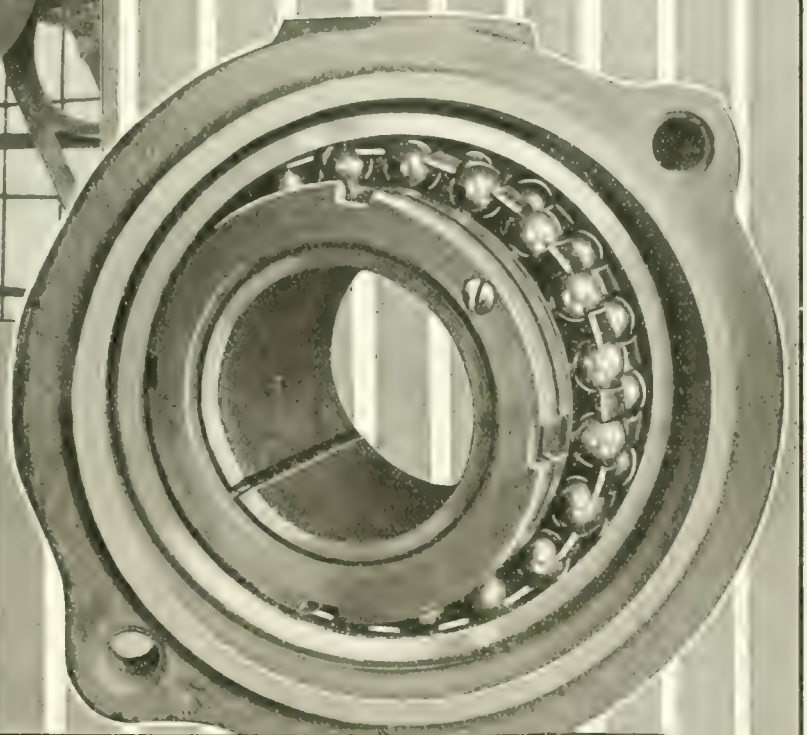

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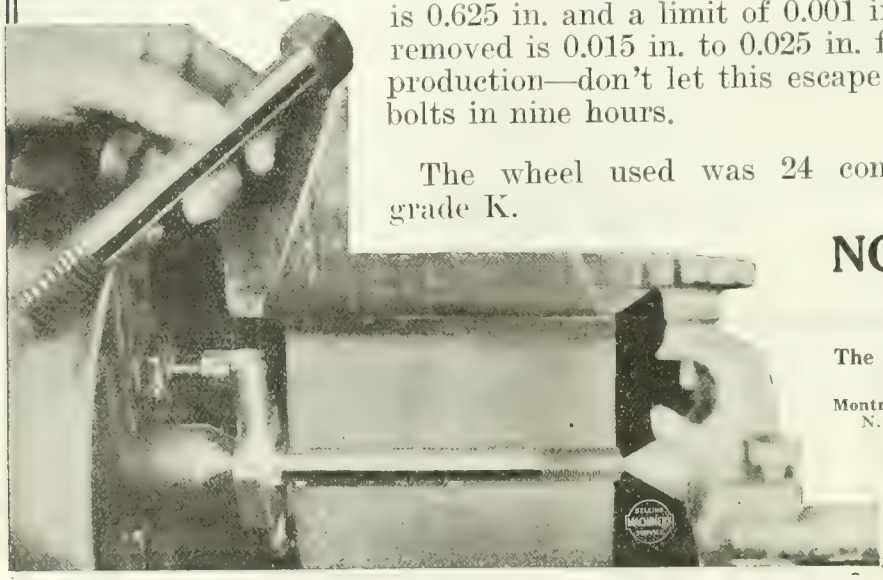

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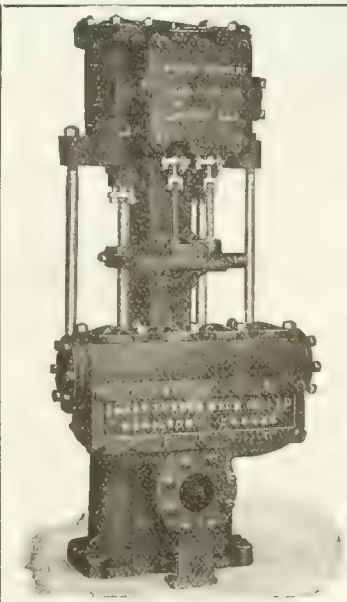

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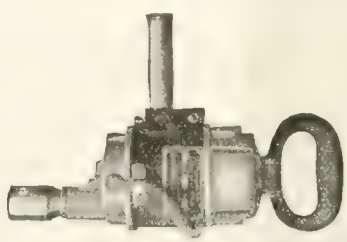

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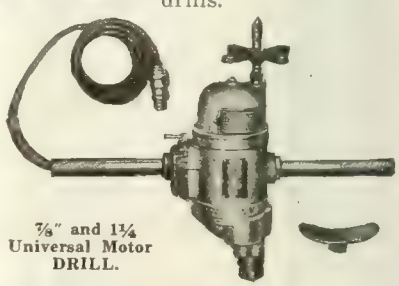

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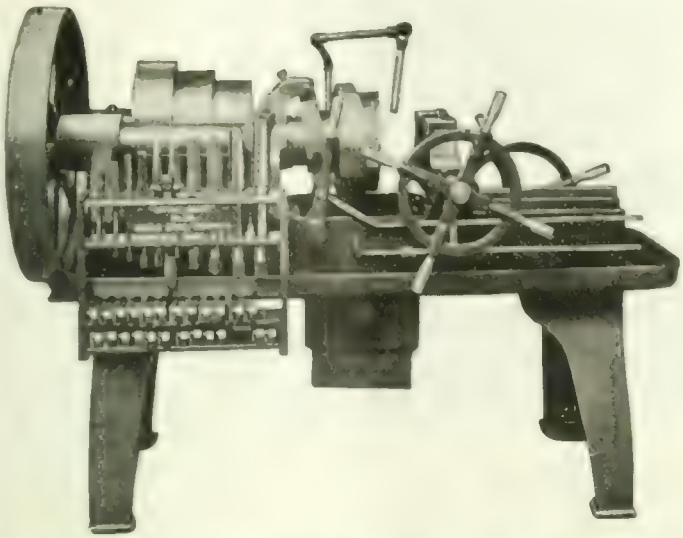

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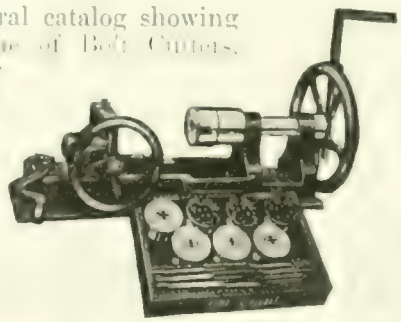

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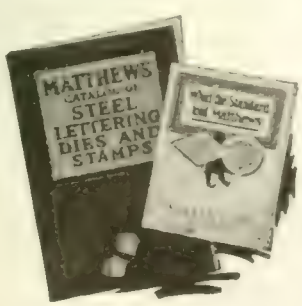

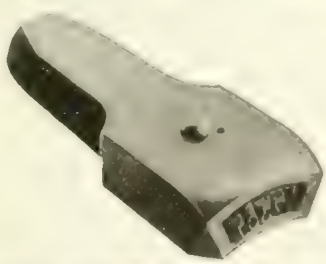

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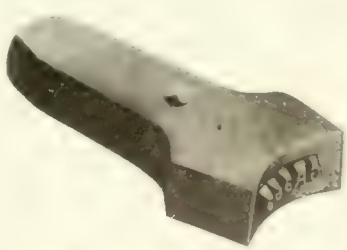

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Press Work Operations in Hospital Equipment Production--I.

By D. A. Hampson

No method can beat the quick production of those parts which can be made to come within that particular field. To cut out sixty pieces of sheet metal per minute of intricate shape, for instance, by any other means would be simply impossible. There is of course the commercial side to be considered and, unless there are enough pieces of the same kind to be made so that the cost of the dies added to the labor charge will be less than the cost by some other method, it is better to adopt the method which does not entail this heavy initial expense. But, if the piece is to be made in large quantities and if it is a job that is recurring, then the savings of the press method speak in loudest terms.

In stamping intricate shapes on the press, the saving in labor charges will be the most apparent, for by no other method could the same piece be produced as quickly and, what is more important in these days, by no other method could as accurate work be turned out by a like grade of unskilled labor. Any person of average intelligence and care makes as good a press hand as the best machinist in a short time and, unlike the latter, is content to stick to the work.

Adaptability of Presses

Presses, or punch presses as they are often called, are used for a great variety of work such as bending, forming, cutting-off, and drawing, in addition to just that of cutting out various shapes from sheets and strips of sheet metal. Quite often assembling operations are performed. It is not always necessary to make a new punch and die for each new job that presents itself; often a notch or a half round is to be cut and by a shifting of the guides on an existing set, the old tools can be made to answer fully as well and at no expense. A careful following of this plan will result in substantial saving and in a plant manufacturing a staple line this can be kept in mind in designing new tools, and a single punch and die with adjustable pieces can be used to form the same piece for the several sizes of the device being made.

There are a number of interesting features to be found in the press work done in a factory that at present makes metal furniture for hospitals though its regular line in peace times is very closely related and many tools that proved their worth in the past were applied or adapted to the new work. Stands, beds, chairs, and cots are equipment that demands no great degree of accuracy in the making. Being of metal they are amply strong for the severest strain that can be put upon them. The external finish is also not as important as would be the case if the pieces were not finally given several coats of white enamel, applied by dropping the piece—whole—in a tank and then baking.

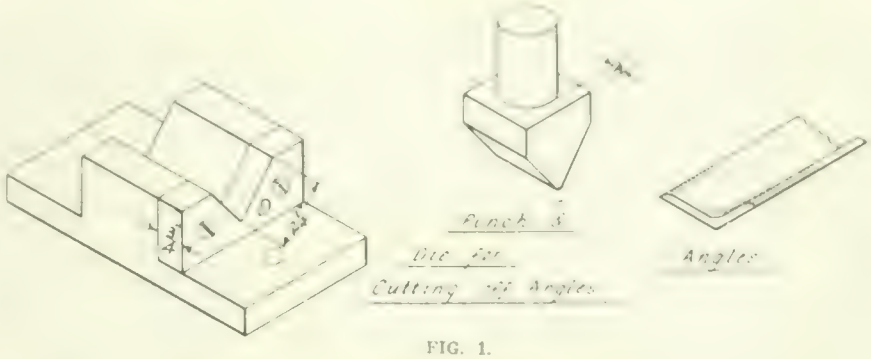

FIG. 1.

Material Used

The materials used on such work are of the poorest grade. That does not mean that the work is slighted because it is heavily coated, for it is not, but there is no economy in putting a piece of automobile steel in a chair when an iron rod of the same size will do as well, show a factor of safety of four, and cost a third of the steel. Rods are of iron, angles and channels and tees are re-rolled material, oftentimes very hard, and sheets are black with more or less scale. These are the materials used for mon rules, for making the clearance between the punch and die a proportion of the metal thickness to be cut, do not give clearance enough for tool economy. In this shop, they always leave 1/64 in. clearance all round for any work down to the thinnest sheet and more for thicker pieces, and they have little or no trouble, a set of tools lasting indefinitely. As an instance, a great many ⅜ in. holes are punched through the ¼ in. thick channels and punches 23/64 in. had been used with fair success and occasional breakages: the press hand carelessly (?) put in a 9/32 in. punch one day and never noticed the difference until it was about time for a broken or stuck punch, and he investigated the lack of trouble. From that time, the shop made all punch fits decidedly sloppy and effected a marked saving in tool upkeep.

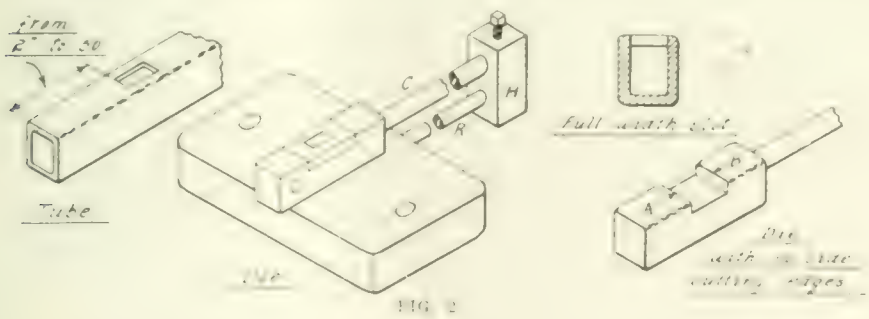

FIG. 2.

The quickest way to cut off any piece of stock is to shear it. Angles are no exception. The punch and die used on the press for this are shown in Fig. 1. The punch is made solid with the shank and gives less trouble than a built up one. A wearing distance A on each side gives the two cutting faces indefinite life. The die D is also double faced, reversible, and like the punch is worn on both faces before grinding. It is held against a planed vertical face of the bolster. As will be noticed, the inner corner of the angles is rounded and the outer one sharp; the tools are made to correspond and to accommodate all sizes up to 2 in.

Notching Tubing

One of the interesting jobs is the cut-

ting of notches in tubing and pipe to receive cross members or stay rods. These notches have to be put in sometimes as far as 50 in. from the end of the tube. The arrangement for this work is shown in Fig. 2. What corresponds to a bolster is a cast iron plate fastened to the bed of the press and having a ⅝ in. rod R set in the back and carrying the block H. In this block another rod C slides and it in turn is set to whatever spacing of notches it is desired to punch. The adjustable rod is fixed to the die proper. This is a soft steel piece, an easy sliding fit in the tubing to be punched: it has an inserted tool steel plate on top that does the actual cutting. In use, the tube is slid over the die piece D until it strikes the block in the rear and the punch is then tripped. There is clearance between the die and the bolster, and the supporting rod is yielding enough so that, under the pressure of the punch, the whole combination rests firmly on the bolster. Cutting is remarkably easy and is neatly done. The tubes have walls varying from 1/16 in. to 3/32 in. thick.

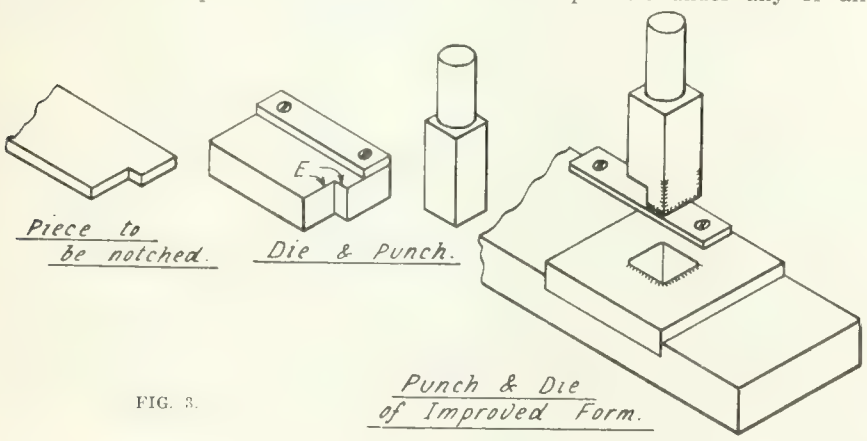

FIG. 3.

When there happens to be a shortage of tool steel of near size, the dies just described are made from worn out files and they give very good service. Some of the tubing dies are made entirely of one piece of tool steel, but usually this is only done when there is to be cut a full width slot as shown by the section. The odd feature of this job is that, though a four sided slot is punched, the die has only two cutting edges, the edges A and B. The average mechanic would not believe that this would produce a good job, but it does as thousands of holes are punched in this way.

Supporting the Punches

An improved form of punch is used in this shop and in many others, but its use is not wide spread. Assuming that a notch is to be cut in the side of a piece of bar stock as shown, the average punch would be a square one and the die an open sided one, both as shown in Fig. 3. With the machine in loose condition, the die poorly set, the shear on the punch ground a certain way, and with careless feeding—all of these conditions would have a tendency to force the punch away from the die and result in a badly burred cut as well as running the risk of bending or breaking the punch. Now with the improved form this is impossible under any or all of the unfavorable conditions. The die is made four sided with two cutting edges, as before, and the other two edges rounded. The punch has an extended end on the non-cutting side which guides it into the die before shearing begins. And, once in the die, the punch is supported against any side movement.

INDUSTRIAL TRAINING IN SCOTLAND

ACCORDING to recent reports in the Times Engineering Supplement, the new scheme of continuation classes which the Glasgow School Board has just put in operation for the ensuing winter session forms at least a promising step in the direction of meeting the educational needs of the workers.

As regards technical education in subjects bearing upon the staple trades and industries, the West of Scotland area is already well organized. In all local centres of industry evening continuation and technical classes are held during the winter months; the former act as a connecting link between the day school and the technical classes and the latter as a preparation for the higher technical education provided at the Royal Technical College, Glasgow. The instruction provided at all local centres is co-ordinated with that of the Royal Technical College, all courses are worked to a syllabus circulated by that body and the classes are subject to inspection and report by the Director of Studies and his staff. In this way a uniform standard is maintained throughout the various local technical schools.

This organization of the technical side of education has already produced good results, and when trade education is organized on equally efficient lines an important step forward will have been taken. That there are numerous difficulties in the way of the attainment of this standard of efficiency will be at once apparent from consideration of the fact that as the scientific facts upon which technical education is built up are universal and unchangeable the same theoretical treatment of any subject is universally applicable, whereas trade practices vary from district to district and from shop to shop, and are subject to constant change and modification also. The vast number of specialized branches which shoot off from parent trades and call for special educational treatment make the fixing of suitable trade school courses a problem of considerable complexity. At present trade instruction is provided for those directly connected with the trades in each of the following subjects:—Mechanical engineering, marine engineering, locomotive engineering, patternmaking and moulding, boilermaking, carpentry and joiner work, masonry and building. In practically all cases lectures embracing drawing office work, simple calculations, and the minimum amount of theoretical work necessary to the intelligent understanding of the trade processes taught form part of the course, and arrangements are made to give special attention and tuition to trade class students who may be in need of it owing to a deficiency in general education.

Only by the direct aid of the heads of commercial and manufacturing firms can progress be made, for the drawing up of a syllabus of trade classes which will be useful to the employees of a group of works of the same trade, but of divergent branches, must rest very largely on an amicable compromise in regard to the special requirements of employers in each branch of the trade. To a great extent the Glasgow School Board has secured the interest and co-operation of employers, but much yet requires to be done to extend the movement and to make the alliance between the educationist and the employer a permanent and increasingly important asset in the development of individual efficiency.

SUBSTITUTES FOR PLATINUM

THE enormously enhanced price of platinum since the outbreak of war has been due to two causes: first, the greatly decreased production (especially in Russia) and the largely increased demand for essential war purposes. In normal times the United States imports about 75,000 ounces (troy weight) of which roughly one-third was used for electrical and chemical purposes, one-third in dentistry and one-third for jewellery.

The special physical and chemical properties of platinum render a perfect substitute a practical impossibility, but recent investigation has produce several alloys which are satisfactory for certain purposes. The only metals which come into consideration as useful alloys with platinum, are iridium, rhodium, palladium, gold and silver. Iridium and rhodium are so rare and are so difficult to work that they are practically excluded and silver is too readily attacked by acids. There thus remains only gold and palladium, but by alloying these three metals in various proportions a number of useful products have been produced, and they have been given the name of "Rhotanium."

HEAT-TREATED GEARING.

By W. H. Phillips.*

STEEL gears may be divided as to material and structure into two general classes, i.e., alloy steels and carbon steels. Alloys of nickel, chrome, vanadium, and similar elements, with the steel, produce a very strong, tough gear which, however, due to its high cost is practicable for only a few special uses. The great field of gearing is served by carbon steel products with entire satisfaction. Since it is possible by heat treatment to increase the life of carbon steel gears by as much as 200 to 400 per cent., with a cost increase of but 25 to 50 per cent., these processes have received much attention. There are now three general classes of treatment in vogue, viz.: Oil treatment, case hardening, special treatment.

The first two were introduced in the above sequence and have met many problems. Each has its advantage for different services and in such has proved very efficient. There are conditions encountered, however, in which these two processes are not applicable. The third process mentioned has been developed after a careful study of actual conditions and embodies the best qualities found in the other two.

There are applications where the service is so light, that the resultant long life and low maintenance cost do not recommend a high grade product. There are other services where the gear must transmit a uniformly high torque without sudden jars or dynamic blows, in which case it is a question of wear alone, requiring such surface hardness as is found in the case hardened product. There are still other applications where the load to be transmitted is uniformly low but with occasional shocks. This last named condition requires a gear with only medium hardness but with high ductility such as the first class or oil treated gear. Other installations, and these constitute a majority, impose both the heavy duty service with its resultant wear as well as shocks with the liability of breakage. It is for such service that the third class or special grades have been developed. By analyzing the conditions and selecting the proper grade, it will be possible to obtain the best results.

Carbon Steel Treatment

With the ever increasing knowledge of steel and its heat treatment being accumulated year by year, the first two grades were improved gradually until now they have been perfected as far as possible and the metallurgist for some time has been looking to other fields for a grade that would include the good qualities of both the above grades yet supplying what they lacked and if possible reducing the cost of the heat treatment. As stated before the alloy steel had to be eliminated due to its cost and the only course left was to develop a treatment for carbon steel that would give the required results.

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It was found that by slight changes in chemical structure, a combination could be obtained, which when subjected to a special treatment produces physical properties peculiarly adapted to gearing. The hardness at the surface of the steel is from three to four times that of untreated steel, and grades off slightly toward the center of the tooth until it is from two and one-half to three times as hard as untreated steel. This reduction in hardness is in a straight line ratio and each fibre of the steel from the surface to the center, or neutral axis of the tooth, which may be slightly to one side of the geometric center, will be stressed in proportion to its ability to carry the load. When the tooth receives a blow or shock, every fibre is carrying its share of the load.

The ductility of this steel is comparatively high and is in inverse ratio to the strength. The metal is homogeneous, there being no line of demarcation between any two fibres. While the surface of the tooth is hard yet it is of a tough hardness and will not check nor spall. It is often advisable to treat the pinion only of a combination, it being the weaker and hardest worked member. A pinion so treated, due to the nature of the harness, is not liable to cause excessive wear on the meshing untreated gear. It can be readily seen that a gear of this type will have a great tendency to overcome breakage and at the same time give a high resistance to wear. It should at least triple the life of untreated gearing, and eliminate the cost of consequential damage and delays caused by gear breakage.

If by increasing the cost of gearing from 25% to 50%, a gear is produced that will more than triple the life of the untreated steel gear and at the same time eliminate breakage with its consequential damage, there can be no doubt of its economy. A few of the advantages to be derived from such a step are:

1.—Lower ultimate cost of gearing.
2.—Reduction of time loss.
3.—Reduction of labor maintenance.
4.—Reliability.

For example the untreated gear costs $20.00 and runs one year. The treated gear costs $30.00 and runs three years. This would show a saving of $30.00 on initial cost. If it requires two hours to make replacement, it would require six hours to replace the $20.00 gear three times, and but two hours to replace the $30.00 gear, or four hours saved in labor, also four hours saved in production of the machine. The hazard of breakage with its consequences is an unknown factor but may be serious in some services.

The wide application of the heat treated gear not only in the railway and automobile field but also in many branches of the industrial field, among the more notable being the steel mills, foundries, glass plants and mines has been so successful that it is not a question of heat treated vs. untreated gearing but rather the selection of the proper grade of treated gear for the service to be performed.

In conclusion it might be said that with many industries of the country working over capacity, the necessity for reliability of machine parts was never before so desirable or the consequences of breakdown so costly. A careful study of the gear situation in the plant or mine should be made at this time and any changes insuring this reliability acted upon at once.

MANUFACTURE OF SYNTHETIC ALCOHOL IN SWITZERLAND

By Mark Meredith

IN 1897 the Uzines Electriques de la Lonza commenced the manufacture of calcium carbide at Gampel, in a works with a motive power of 2,000 h.p., and similar enterprises were commenced about the same time at Lauterbach (near Soleure), Neuhausen and Thusis. From that time onwards the industry has grown enormously, owing to the great developments in the utilization of hydraulic power, and has now become one of the most important industries in the whole of Switzerland, the present output of carbide being about 70,000 tons per annum, and absorbing some 45,000 h.p.

Until quite recently the chief use of calcium carbide was for generating acetylene for lighting and more latterly for autogenous welding, but it has other applications as well, such as the fixation of atmospheric hydrogen. If finely powdered carbide be heated to about 1,000 deg. C., it combines with the nitrogen of the air to form calcium cyanamide, which is in growing demand as a fertilizer, computing with nitrate of soda and sulphate of ammonia. Treated with steam, calcium cyanamide furnishes ammonia, and calcium carbide therefore may serve as the raw material in making sulphate of ammonia, and, indeed, for nitric acid too.

A new industry is now springing up, which is based on the fact that acetylene is an unsaturated hydrocarbon, namely, the manufacture of acetic acid and alcohol, for which purpose the La Lonza Co. is erecting a works in the Valais canton, and has applied to the Swiss Excise Board for a twenty years' concession, the object being to render the country independent of foreign countries in respect of products which have hitherto had to be imported. The production of alcohol from calcium carbide is effected by treating acetylene in such a way as to combine with it one molecule of water, acetaldehyde being formed. This product is readily oxidized, one atom of oxygen giving acetic acid, whilst two atoms of hydrogen furnish alcohol. Briefly the production of this synthetic alcohol is as follows: Calcium carbide is produced by fusing quicklime and coal together in the electric furnace, and acetylene is generated by adding water to the carbide. The purified gas is treated, in a special apparatus, with mercury salts, and transformed, by the addition

of water into acetaldehyde, which in turn is converted into alcohol by combination with hydrogen.

Apart from the manufacture of the carbide, the production of the necessary hydrogen entails a very large consumption of electrical energy. To make one ton of alcohol requires, in practice, two tons of carbide and 500 cubic metres of hydrogen, the former needing 8,000 kilowatt hours and the latter 3,000 kilowatt hours of electrical energy, or 11,000 kilowatt hours in all, to say nothing of 2½ tons of coal and four tons of lime. The new La Lonza works are constructed for an output of 7,500 tons of alcohol per annum, with a possible increase to 10,000 tons, which is equal to the average annual imports of this product to Switzerland. The manufacture will consume 100 million kilowatt hours of electrical energy and 20,000 tons of coal, which latter must be imported.

WOMEN ENGINEERS IN BRITAIN

A THOUSAND women are wanted at once to train for engineering and other advanced forms of work in the munition factories. The call is urgent, and to enable patriotic women to offer their services immediately the Training Section of the Ministry of Munitions is providing free instruction in machine work (general and more advanced), oxy-acetylene welding, aeroplane woodwork, optical instrument work, draughtsmanship, electrical work, core making, etc., etc. Instructional workshops, where the conditions of the best modern factories obtain, have been set up in London, Birmingham, Bristol, Luton, and Manchester, and other training centres have been established in twelve Metropolitan areas and in twenty-four provincial districts, as well as in four centres in Scotland.

An appeal is made to women who are adaptable and intelligent, of good physique, and between the ages of eighteen and thirty-five years, to offer themselves at once for training in this essential war work. Such women are to be found in every class of society, and they are asked to apply at once to the Director, Training Section, Ministry of Munitions, 6, Whitehall Gardens.

BIG INCREASE IN LUMBER OUTPUT

THE volume of logs produced in the Vancouver district of British Columbia during August showed a very substantial increase over that of August last year, being no less than 12,000,000 feet in excess of the production for that month.

W. W. B. Armstrong, secretary of the B. C. Loggers' Association, discussing the logging situation generally, declared that while the demand for lumber had increased greatly of late, owing in a large measure to shipbuilding, it was not anticipated that there would be any shortage of supply, nor did he anticipate there would be any great surplus. It is understood that some yards have recently experienced difficulty in getting certain special kinds of lumber, but this condition was stated not to apply to timber in general.

Each of the forty wooden ships now on the building programme in this province would, it was said, absorb 1,500,000 feet of lumber, making a total of 60,000,000 feet which would be required in all for this purpose alone. As indicating the manner in which shipbuilding had influenced lumber production, it was pointed out that according to Mr. Van Dusen, district forester, 2,000,000 more feet of Douglas fir was produced in August as compared with the corresponding month last year, when the output was 36,000,000.

According to figures it is indicated that perhaps the greatest effect which the war has had upon the lumber industry of the province, is in respect to the production of spruce, which is used chiefly in the construction of aeroplanes. In this district in August, 1916, only 2,200,000 feet of spruce were scaled, while in August this year the output had jumped to approximately 7,000,000 feet. Hemlock and other timber also showed big increases, and it was estimated that if the present rate of increase continued the year's output of lumber will show an increase of about 52,000,000 feet over last year.

PICKLING VS. SAND-BLASTING

IN a paper read before the American Drop Forge Association it is stated that, in the drop-forge industry, pickling, tumbling and sand-blasting are the three principal methods used for cleaning. Pickling is the preferable way if the acids and salts are thoroughly washed from the surfaces of the forgings. There is no favorable comparison between pickling and sand-blasting. In the former method all surfaces are cleaned thoroughly from oxides or foreign substances, which are detrimental to the machining operation, while in the tumbling and sand-blasting fine sand is hammered into the surfaces. The resulting cost of machining is from 300 per cent. to 400 per cent. more than that of pickled forgings. Moreover, the drop-forgings that have small bores or indentations are not cleaned properly except by pickling. The additional cost of pickling is more than offset in the machining.

TESTING YOUR PRODUCT UNDER ACTUAL CONDITIONS

By A. L. Loy

IN the drilling of oil wells, the use of steam as a motive power has always been pre-eminent. This was due, somewhat, to the partiality of the driller and also to the flexibility of this power. One manufacturer of oil engines, in endeavoring to introduce his engine and other apparatus for this class of work, decided to test the engine under the actual conditions such as would prevail in the field. Being located in a district in which crude oil had at one time been found quite extensively, a well was drilled right in the yard of the plant. A regular driller was hired who had previously used nothing but steam, thus subjecting the engine to the same care it would actually receive in the field. While this seemed rather an expensive sort of a test, as the well proved to be a non-producer, yet this very test brought out all the weak points in the design of the engine for this particular class of work and, needless to say, there were many. It would have been a much more expensive procedure to have put the engine out on the market and let others discover these points. The engine is located in the corrugated iron shed at the left and is not visible itself. Even in the machine tool field at the present time we find many tools which show that they have not had a sufficient test under actual running conditions before being placed on the market and the purchaser very naturally resents being put to the expense of doing work which should have been done by the manufacturer himself.

TESTING OUT OIL DRILLING MACHINERY IN THE YARD OF THE MANUFACTURER.

UNIQUE SPECIMEN OF OLD-TIME PLANING MACHINE WITH CHAIN DRIVE.

AN INTERESTING OLD PLANER

By D. S. Mann

THE writer recently ran across the old planer shown in the cut in the toolroom of a factory manufacturing wooden pails. The planer had been in their plant for about three years but they were unaware of the original purchaser. According to the name plate it had been built in Boston in 1848. It will be noticed that the table is driven from the link chain. The vees supporting the table are inverted, presumably so as not to retain any chips which might fall upon them. The crossrail is raised and lowered by the central screw. An automatic cross feed is also provided.

TESTING STEAM HEATING APPARATUS

By T. J.

A CERTAIN weight of steam at a certain pressure, and, therefore, containing a certain number of heat units, raises the temperature of a certain volume or weight of water or air a certain number of degrees, absorbing a definite number of heat units; the proportion between the heat units absorbed by the water or air and the number present in the steam entering the heating apparatus is the measure of the efficiency of the apparatus. By keeping records of these quantities, any failures, and tendency to failure on the part of the heating apparatus, will be given early notice of. Exhaust steam that has done its work in an engine is often very properly used for heating apparatus purposes; it sometimes carries the vapor of oil that has been used to lubricate the piston of the cylinder, and the oil is deposited upon the steam surface of the steam pipes used in the heating apparatus. A very thin film of oil interposes a considerable resistance to the passage of heat from the steam to the water, so that more steam is required to heat the water to a given temperature. The steam flow charts, compared with the water flow and [illegible] chart, should give warning of this, and show the engineer when the steam pipes [illegible]

Grids of steam pipes sometimes leak at the joints, some of the steam passing through the leak into the water. This may be very bad where the water is used for certain purposes and requires to be checked; the steam and water charts should again give warning by the smaller quantity of steam used to heat the water. When steam is delivered directly into a body of water, the whole of the heat units it carries go to raise the whole of the water's temperature; when the steam is flowing in a pipe and the water is surrounding the pipe, the usual arrangement in steam heating apparatus, only a portion of the heat units present in the steam go to raise the temperature of the water.

The check upon the use of the steam for heating may be carried still further. Whether the radiators or heating pipes employ steam or hot water, a certain definite number of heat units are delivered to each radiator, and each length of pipe, and the heat units are employed in maintaining the pressure of the air in the plant to be warmed against the continuous flow of heat from it, through the walls, windows, etc. The flow of heat outwards varies with the difference of temperature between the inside and the outside atmospheres; its rate differs through the walls and windows, but it may be calculated with a fair approximation. The proportion between the heat units delivered in the radiators and those absorbed by the air of the apartment in making up for the outflow will be the measure of efficiency of the radiators. If a record is kept also of the temperatures in different parts of each apartment heated, and of the quantity of steam or hot water, and their temperatures delivered to each radiator, a check will be furnished upon the heating system of each apartment, of each building, and of the heating system as a whole.

POWER FROM SAWDUST

By L. E.

WITH the object of affecting further reductions in the transit and use of anthracite coal for gas making for gas engines, experiments have been made with the use of sawdust and shavings. All users of suction gas plants who have quantities of this material available will find that their gas engines will work equally well on sawdust as on coal, and that three tons of sawdust will give the same results as one ton of anthracite coal. For the conversion of sawdust into gas, the plant is slightly larger than for coal, and with the addition of a tar extractor the principle is the same. The possibility of the use of these waste materials is not so generally known, so that the volume of sawdust wasted and destroyed is serious.

CHILLED iron is the result of the sudden cooling of molten cast iron when poured against an iron ring which is part of the mold. Its discovery is said to have been accidental. In an English foundry, in the eighteenth century, the slopping over of a ladle of cast iron caused part of its contents to come in contact with cold iron lying on the floor. In breaking up this scrap it was discovered that the iron was white and much harder than that secured from the ordinary foundry process of pouring the metal into a sand mold. The result of this discovery was the introduction of chilled iron.

THE attention of the British Food Controller has been called to the wastage of foodstuffs in some of the iron foundries. It is the custom for a considerable quantity of flour, either wheaten or rice, to be used to "dust" the moulds before pouring the molten metal. In practice there is required on an average from 1½ lb. to 2 lb. of flour in the working of seventy to eighty moulds per day, the size of moulds or flasks used being 24 in. by 12 in. For small work, approximately 20 lb. to 30 lb. of flour would be used per ton of castings. An experiment has shown that fine sawdust constitutes an efficient substitute, also that wood dust, such as is produced in finishing wood on sand or glass paper machines, is better than flour—either wheaten or rice.

DROP-FORGING dies made from alloy steel castings are now in use with a gratifying degree of success. The most satisfactory alloy, according to the "American Drop Forger," is vanadium-carbon steel, with a fine close-grained structure. The use of vanadium gives the necessary combination of toughness and hardness with exceptional wearing qualities and resistance to cracking. A run of 40,000 motor-brake support forgings was, for example, made from a pair of cast-steel dies without any great amount of wear. For general drop-forge work the best practice is to cast the dies with the tenons and with the impressions for breakdowns approximately to shape, allowing a small amount for finish. The impression for the die is then sunk in the solid block. For plain forgings, the impressions also are sometimes cast in the dies, allowing some metal for finish. Cast vanadium-steel dies, when properly annealed by the foundry, can be machined without much difficulty. After being machined the general practice is to heat the dies to 1,550 deg. or 1,575 deg. Fah., and quench in oil, and in most cases no further heat treatment is required.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

THE MANUFACTURE OF HARDENED THREAD GAUGES—I*

By G. Doorakers

VERY little practical information has been published concerning the manufacture of hardened thread gauges. The available data usually do no more than inform us how to determine the correct thread, and make little attempt to show us how to obtain it. The optical way of checking the gauge is, of course, an excellent one, but in the following notes I shall only give a mechanical way of checking, which has, in all respects, compared very favorably with the optical way.

In settling the layout for the manufacture, the first item of importance is what machine to employ. The lathe is most commonly used, but in some cases thread milling machines are used with fairly good results. For the finishing of a reliable screw gauge, however, a lathe is hard to beat. It is necessary to select one with a correct lead screw, as all results will depend upon that item. All other faults can be easily rectified. The lead screw can be tested by screwing a plug of a certain pitch, but as the screw may vary in different places, it is necessary to use in making the gauges the same part that has been used for the test, unless we test a considerable length, by screwing plugs 1 in. or 2 in. long, in different places between the centres. By carefully numbering and marking these test pieces we may obtain an accurate record of the lead screw. If we cannot test the pitch ourselves we have to depend on the report from a reliable source.

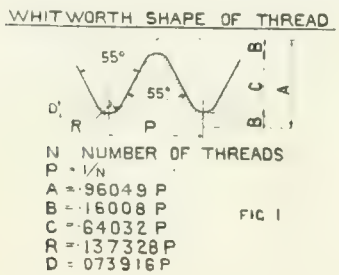


FIG 1

The Whitworth shape of thread being most commonly used, in England at any rate, and at the same time being the most difficult to produce, we will only consider that particular shape of thread.

Fig. 1 shows the shape of the thread, and the value of some of the most important dimensions expressed in terms of the pitch. For cutting a correct thread internal as well as external circular form tools are used, and to obtain these form tools we set out from two original tools, which we will call the master tools. The first tool which cuts the flanks of the threads, and the correct radius at the point, will be called the male master tools, and the second one, which cuts the radius only, will be called the female master tool.

*Contributed to a recent number of The Engineer.

Male Master Tool

Fig. 2 shows the male master tool, which is made of round material. The round shape was chosen because it is easy to manufacture, and at the same time cheap. The cutting edge of the tool has no top rake. The angle in the flat must therefore be exactly 55 deg. The front relief is 15 deg. The first thought was, of course, how to produce that 55 deg. angle in the flat, combined with the 15 deg. relief. For that purpose a fixture, shown in Fig. 3, was designed. This fixture can be bolted on the table of a surface grinder, or used on a magnetic chuck.

To obtain the greatest obtainable accuracy the pegs A are kept as far apart as possible. The tools are therefore made in double lengths, and a nick is turned half-way down to fit peg B, so that when the finished cut is taken over the four sides with one setting of the wheel, the angle in the cutting edge will be central, and both tools will be the same length.

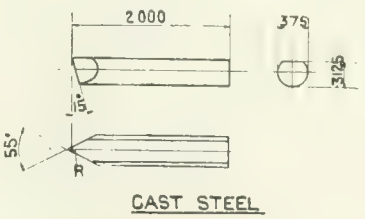


FIG 2

The tools are laid with the flat side against the planes V, and held in position by a little clamp plate. The diameter of the pegs A was made .376 inches to allow for a press fit in a .375 in. hole. The angle of the flats in the cutting edge is 55 deg., therefore the pegs A in the planes V make an angle with the vertical which equals 90 deg.—27 deg. 30 min. = 62 deg. 30 min. The angle of inclination of the planes B with the vertical is the complement of the angle a in Fig. 4.

Fig. 4 represents a perspective view of the point of the tool. Assume A C =1. In triangle A B C, A B = tan 15 deg.

In triangle ABD, AD=AB sine 27½ deg.

AD=tan 15 deg. × sine 27½ deg.

In triangle A C D:

$$\tan a = \frac{1}{AD} = \frac{1}{\tan 15 \text{ deg.} \times \sin 27\frac{1}{2} \text{ deg.}}$$

a=82 deg. 57 min.

The angle of inclination of the planes V—Fig. 3—with the vertical is the complement of angle a and therefore 7 deg. 3 min. The angle of 55 deg. is verified by a gauge shown in Fig. 5. This gauge consists of a cast iron plate with a hole in it. The pegs A are so arranged that when the hardened parallel strips B are laid against them the whole point of the tool is visible against the light through the hole. The positions of the pegs A in relation to one another are very important, and a template must be made for drilling and reaming these holes. After grinding the flats the required radius was originally produced by an oilstone, but as oilstoning is a lengthy and an unsatisfactory job, a fixture was devised to produce the radius in a mechanical way.

Fig. 6 shows the general arrangement of that fixture. It is clear that the success of the fixture depends on the accurate spacing of the pegs A, which are the stops for peg B. In rotating the knob from one stop to the other, the angle traversed must be exactly the required angle. For that reason four holes are bored round the centre hole, and after calculating all the chords, a template is made to bore the holes, three of which are carefully bushed afterwards. The top hole is utilised as a centre, which serves for setting the fixture exactly under the centre of the wheel. The pegs A and B are made a good fit in the bushes, and can therefore be easily replaced in case of wear. At the same time it makes it easy to replace the pegs A by different diameters which will be found useful later on.

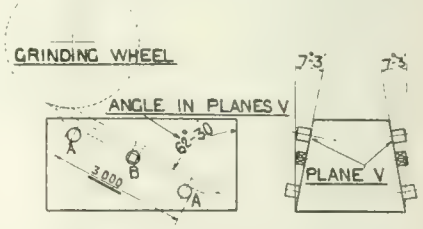


FIG 3

With the new fixture it is possible to grind the sides as well as the radius in one adjustment, and it therefore supersedes the other fixture. The first fixture—Fig. 3—was, however, still used for roughing the angle. As the removal of a large amount of metal has a tendency to soften the point, the tools are rehardened on the point after roughing, and then finally ground on the radius fixture. It might be mentioned that the first fixture is used later on for producing sharp pointed tools with different angles.

The radius fixture is used on a sur-

face grinder bolted to the table, or on a magnetic chuck. When the tool is clamped down with the flat against the face, turn the knob to the extreme right and take a very light cut over the one side, moving the table to and fro. Then turn the knob to the extreme left and do the same.

To produce the radius set the fixture under the centre of the wheel, and move the knob from right to left and vice versa. Repeat this process until the correct radius is obtained. By grinding the radius in the above-mentioned way a slight error is made, because the tool is tilted forward 15 deg. In the fixture the true radius is ground in a plane at 15 deg. angle with the plane in which the radius ought to be true. Calculation shows this error to be very slight, especially for the finer pitches.

With a more elaborate fixture even this error can be nullified by a compensating arrangement, consisting of a cam and a slide, but up to and including twelve threads per inch a compensating arrangement of the kind is unnecessary. For fourteen threads the extreme point of the radius is about .00017 in. short, which I feel sure cannot be improved by oilstoning. The angle of swivel on the fixture is the angle in a plane, making 15 deg. with the plane of the 55 deg. angle—see Fig. 7.

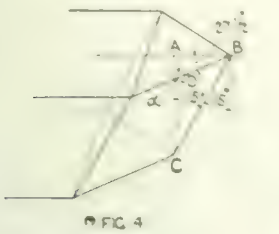


FIG 4

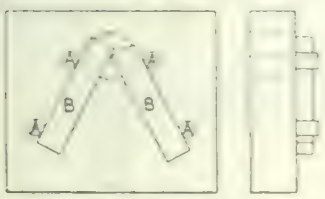
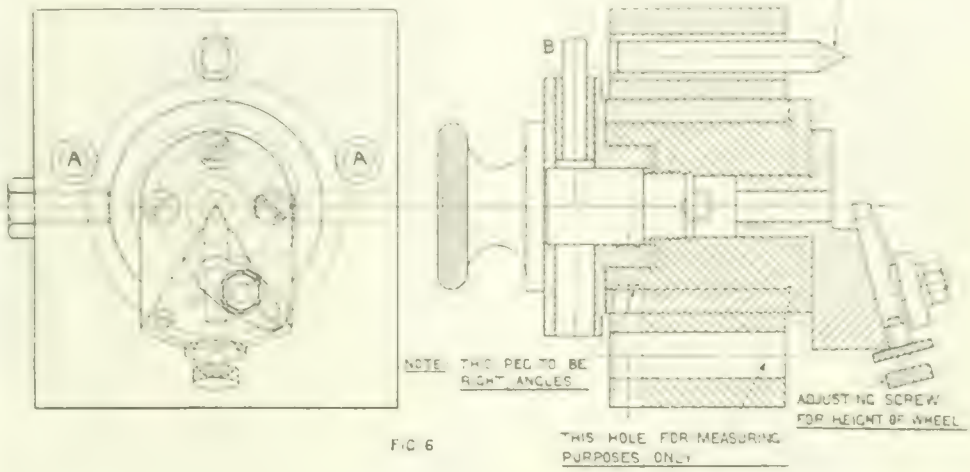


FIG 5


FOR SETTING FIXTURE UNDER CENTRE OF WHEEL
A
B
NOTE THIS PEG TO BE RIGHT ANGLES
ADJUSTING SCREW FOR HEIGHT OF WHEEL
THIS HOLE FOR MEASURING PURPOSES ONLY
FIG 6

In triangle C E A: angle C E A = half the required angle.

$$\tan \text{angle C E A} = \frac{A\,C}{C\,E}$$

The required angle is therefore 2 × tan 27½ deg. / cos 15 deg. = 56 deg. 38 min. 35 sec.

The angle of movement of the radius fixture, i.e., the angle of movement of peg B between the two pegs A is the supplement of 56 deg. 38 min. 35 sec.—see Fig 8.

The angle a the pegs A make with the centre line =

$$90 \text{ deg.} - \frac{56 \text{ deg. } 38 \text{ min. } 35 \text{ sec.}}{2} + b.$$

b is dependent on the diameters of the pegs and the radius R.

$$\text{sine } b = \frac{\frac{1}{2}(D + d)}{R}$$

Angle a = 61 deg. 40 min. 42 sec. + b.

For the fixture I designed the values for the pegs and the radius were chosen as follows:—D = .500 in., d = .375 in., R = 2.4375 in., therefore sine b = $\frac{.500 + .375}{2 \times 2.4375} = \frac{.4375}{2.4375} = .17948$, b = 10 deg. 20 min. 24 sec., and a = 61 deg. 40 min. 42 sec. + 10 deg. 20 min. 24 sec. = practically 72 deg.

From Fig. 1 we see that by producing the radius the overall length of the tool shortens by a distance B = .16008 P. As it is very difficult to measure a tool over a sharp point, I made the gauge shown in Fig. 9. A micrometer reading can be taken from the back of the tool to the top of the small plate, which provides at the same time an accurate reading from the back of the tool to the point by subtracting a constant.

Fig. 10 shows the same gauge. The master tool being 55 deg. in the cutting edge, and the rake being 15 deg., the angle in section C A is 56 deg. 38 min. 35 sec., as calculated before. By using a ball of known dimensions, we can measure the distance K H. The distance G H can be calculated. The distance K G can therefore be found by subtraction.

The dimension from the back of the tool to the sharp point is the difference of the distance from the back of the tool to the top of the small plate and the distance K.G. The distance from the sharp point to the top of the radius of the tool being .16008 P, we know that the distance O from the back of the tool to the top of the radius is O = L—(K G + .16008 P). K G = K G − G H, where K H is measured, and G H is calculated as follows:—

In Fig. 10, AC =

$$\frac{d}{2 \times \text{sine } 28 \text{ deg. } 19 \text{ min. } 17\frac{1}{2} \text{ sec.}}$$

$$A\,D = \frac{A\,C}{\cos 15 \text{ deg.}}$$

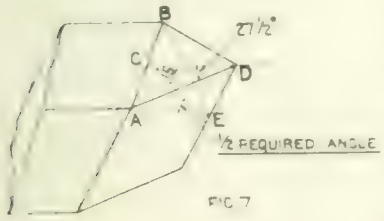


FIG 7

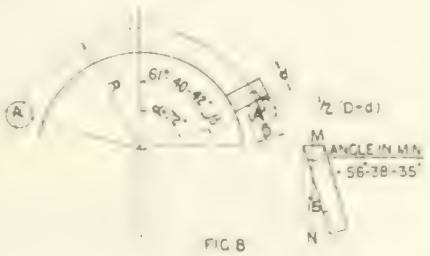


FIG 8

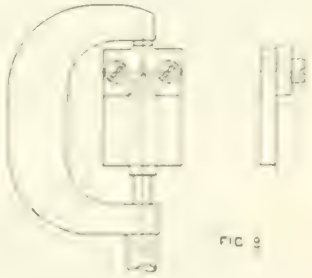


FIG 9

In Fig. 7 angle B D A in triangle B D A = 55 deg. Triangle B E A lies in a plane making 15 deg. with the plane of the 55 deg. angle.

Assume C D = 1, then in triangle A C D: A C = tan 27½ deg.

In triangle C D E: C E = cos 15 deg.

$$A\,D = \frac{d}{2 \cos 15° \times \text{sine } 28°\ 19 \text{ min. } 17\frac{1}{2} \text{ sec.}}$$

$$E\,G = \frac{d \tan 15 \text{ deg.}}{2}$$

$$H\,G = H\,F + A\,D + E\,G.$$

$$H\,G = \frac{d}{2} + \frac{d}{2\cos 15^\circ \times \sin 28^\circ\ 19\ \text{min.}\ 17\tfrac{1}{2}\ \text{sec.}} + \frac{d\tan 15\ \text{deg.}}{2}$$

$$= -\left(1 + \frac{1}{\cos 15 \cdot \sin 28\ 19'\ 17\tfrac{1}{2}''} + \tan 15^\circ\right)\frac{d}{2}$$

The gauge I made was checked with two balls, one 3/16 in. diameter and the other ¼ in.

The measurement K H over the 3/16 in. ball was .6258.

The measurement K H over the ¼ in. ball was .7335.

The calculated distance H G for the 3/16 in. ball was .3235.

The calculated distance H G for the ¼ in. ball was .4312.

If the gauge is correct the distance K G must be the same in both cases. K G = K H — G H = .3023. That distance is a constant, and can therefore be etched on the gauge.

Example 1.—The distance L for a fourteen-thread master tool measures 2.250.

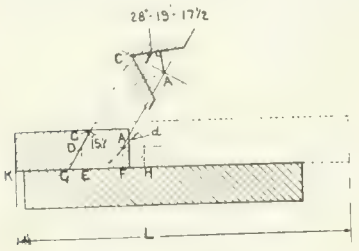


FIG 10

O = L— (K G + .16008 P) = 2.250— (.3023 + .01143) = 1.9363.

Example 2.—The distance L for a twenty-four-thread master tool measures 2.2830.

O = L — (K G + .16008 P) = 2.2830 —(.3023 + .006669) = 1.9740.

The manufacture of the top plate of the gauge presents no difficulties if it is done in the following manner:—Mill a piece to dimensions for length and width, but leave it about ¼ in. thicker, as the carbon has to be milled off on both sides for drilling purposes. Then mill the angle with an angle cutter. After carbonising, mill ⅛ in. off each side, and clean up angle with cutter. Then harden, and clean up the angle with an oilstone. In the cleaning up the only care to be taken is that the sides

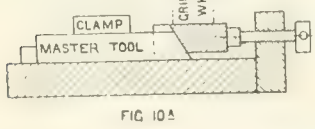


FIG 10A

must be flat, for the angle corrects itself on the fixture shown in Fig. 10A.

In that fixture the plate is clamped to a carefully ground master tool, and the top face is ground on a surface grinder. It is, of course, vital that the bottom plate of the fixture be ground parallel. After grinding the first side in correct relation to the angle, the other side can be ground parallel on the magnetic chuck.

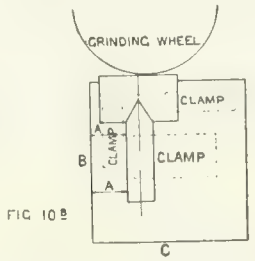


FIG 10B

The edge of the plate opposite the angle must be square to the angle and to the sides. For that purpose it is ground on a fixture shown in Fig. 10B. The fixture consists of a square block, of which the sides B and C are flat and square. The master tool is set up parallel to face B, and clamped against the face. By grinding the edge of the plate, it will be square in relation to the angle and the sides. The finishing will present no further difficulties.

PIPE THREAD TAP HEADS

The Sheffield Small Tool Manufacturers have adopted the following list of sizes for the squares of pipe thread taps:

No. of	Size of □ Fraction	Decimal Inches	Whitworth Thread Taps Inches	International Thread Taps Millimetres	Gas Tap Inches
0	7-64	.109	1/8	3 to 3½	
1	9-64	.140	5-32	4 to 4½	
2	5-32	.156	3 16	5	
3	13-64	.203	¼	6 to 7	
4	15-64	.234	5 16 and 3/8	8 to 10	1/8
5	9-32	.281	7-16	11 to 12	
6	5-16	.312	½ and 9-16	13 to 14	¼
7	25-64	.390	5/8 and 11-16	15 to 17	3/8
8	29-64	.453	¾ and 13-16	18 to 21	½
9	35-64	.546	⅞ and 15-16	22 to 23	
10	41 64	.640	1	24 to 26	⅝ and ¾
11	23-32	.718	1 1/8	27 to 30	
12	13-16	.812	1 ¼	31 to 33	⅞ and 1
13	27-32	.843	1 3/8	34 to 36	
14	29-32	.906	1½	37 to 41	1¼
15	1 5-64	1.078	1⅝ and 1¾	42 to 46	1½ and 1¾
16	1 13-64	1.203	1⅞ and 2	47 to 52	
17	1⅜	1.375	2 1/8 and 2 ¼	54 to 58	2 and 2¼
18	1½	1.500	2⅜ and 2½	60 to 64	
19	1⅝	1.625	2⅝ and 2¾	66 to 70	
20	1¾	1.750	2⅞ and 3	72 to 76	2½ to 3

Notes

Intermediate diameters have same squares as sizes below.

The heads of fluted hand reamers have same size squares as Whitworth taps and International thread taps respectively.

The sizes of squares are stated in fractions, and in decimals of inches, to facilitate measurements with either the mechanics' rule or the micrometer calliper.

No. of square may be quoted when ordering tap wrenches.

MACHINING NO. 103 FUSE BODIES

Herbert's Monthly Review

THE No. 103 Fuse is an improved design of the Graze Fuse No. 100, the principal difference being that the body is made in cast iron instead of gunmetal.

It was found that cast iron, if sound, is quite suitable, and the saving in the cost of the material over gunmetal is very considerable. At first sight it appeared as though the machining time would be increased through using cast iron, and the first consideration, therefore, was to obtain a material which would be both homogeneous and easy to machine. With a view to securing such a material, a number of experiments were carried out, which showed that the iron is best cast in bar form in permanent moulds, on the system which we have used for a number of years. The cast iron bars, when sawn up into blanks, provide a material which is sound, easy to handle, and which can be machined at high speeds.

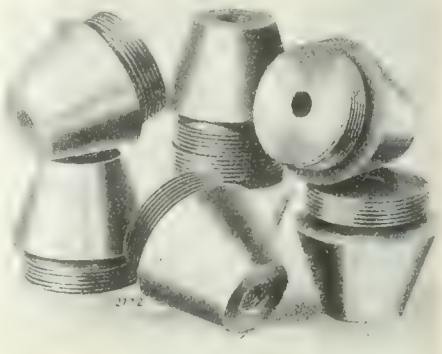


FIG. 1

In Fig. 1 is shown a number of finished fuse bodies as produced on a No. 4 Capstan lathe and the lay-out which is used on these machines will doubtless be of interest at the present time. In laying-out the tools, it was considered that "Stellite," which has now passed the experimental stage, could be used to advantage for several of the cutting tools, and preliminary experiments confirmed this.

At the first operation, which is shown in Fig. 2, the blanks are held in a 9-in. Coventry chuck and positioned by a stop. The first tool used is a centering and facing tool, which is followed up by a twist drill for the small diameter, which goes part way through. The turning of the thread diameter is done

tool holder fitted with a "Stellite" cutter. This is shown in greater detail in Fig. 3. The roughing cut is done at a speed of over 150-ft. per minute, and [illegible] The finish facing of the conical sh[illegible] and the chamfering at the end are done simultaneously from the square turret.

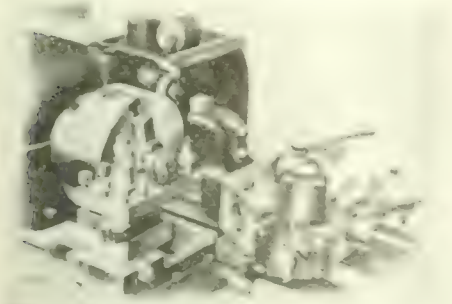


FIG. 2

[illegible] thread is cut with our standard inverted chaser holder. The time for this operation is two and a half minutes.

At the second operation, shown in Fig. 4, the partly finished fuse body is held by the thread in one of our special drawback chucks which have been described on previous occasions. The first tool is a turning tool carried in the square turret, which removes the scale before forming. It has a "Stellite" [illegible]

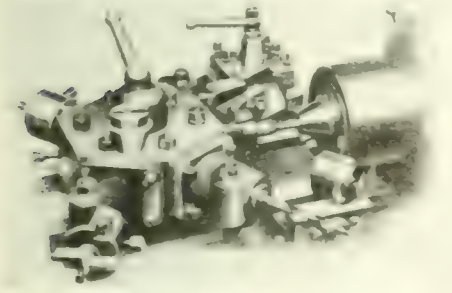


FIG. 4

on to a carbon steel shank. The rough taper form tool which follows it is also a composite "Stellite" tool carried in the square turret. The end is then centred, faced and drilled, the drilled hole providing a support for the finish forming tool shown in position. The hole is finally reamed and tapped, completing the operation, which occupies three and a half minutes.

The "Stellite" turning tool holder used at the first operation has given such good results that it was decided to standardize it, and it is now offered for use on engine lathes as an ordinary sliding tool. Two views of the tool in this form are given in Figs. 5 and 6.

It has been found that this method of using "Stellite" is very satisfactory and economical. As will be seen, the cutter is presented tangentially to the work with a natural front and side clearance of 6 deg. The cutter is ground only on the end which enables the top rake to be varied to suit different materials without weakening the cutter in any way. This method of grinding is not only the most economical, but also the most suitable when "Stellite" cutters are used, since there is no excuse whatever for impairing the exceptional cutting qualities of that alloy by grinding away the very hard skin which forms the sides of "Stellite" bars. The adjustable clamping device holds the tools securely, and will accommodate all likely variations from the nominal size of cutters. A positive support is provided, which also serves to adjust the height of the cutting edge.

These holders are designed for turning only, and are not suitable for facing, but the range of work on which they can be used to advantage is very wide.

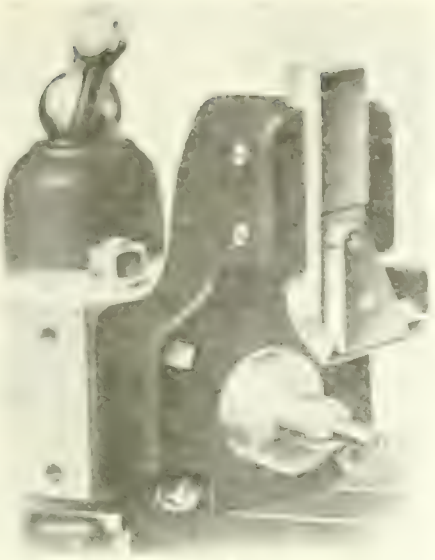
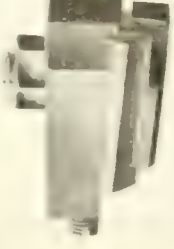
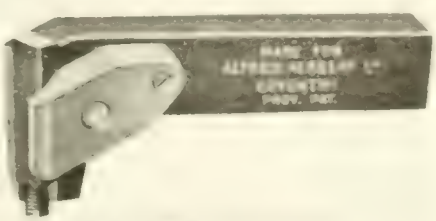


FIG. 3





FIGS. 5 AND 6

SAVING WEIGHT ON MACHINE PARTS

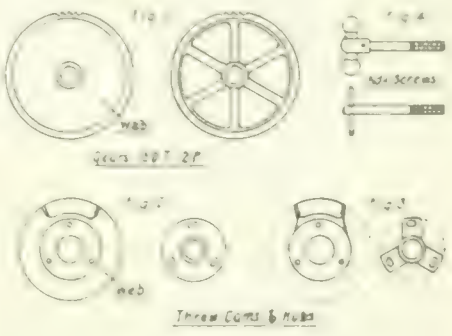
By J. E. C.

THE continual rise in the price of materials such as steel, cast iron, etc., has necessitated of course, an increase in the price of machines and tools. Placed beside this is the fact of the scarcity of metals, concerning which, in the present state of things, little encouragement is to be had from the usual sources of supply.

A careful study in machine design has disclosed many instances where a great deal of stock is, to use a very strong expression, "wantonly wasted." Surplus metal is found where it could easily have been saved. When we consider a machine that has been built and sold, we look at it from the point that it is to be installed and used for an indefinite period, or until the time it will be scrapped, or similarly disposed of. The surplus amount of metal in any machine which has been built, more especially if the machine is to be tied up, unused, would have been better left unmined, than wasted by uneconomical designing.

There are, however, few machines, no matter how well designed these may be, but what will stand a certain amount of reduction in their material without in any way destroying their utility or productiveness, if only these are given proper study to find out where the reductions can be made.

A few brief illustrations are given,



showing where, in a number of instances, a common waste is found on machine parts. In a certain type of machine, built in lots of 50 to 100, there is used a 150 tooth 12 pitch gear. This gear has a thin web wall instead of spokes. Changing this gear into a six-spoke type reduced the weight of the casting five pounds, the saving on a hundred gears amounting to $40.00.

An adjustable throw cam which fastens in a hub, had a web rim, (see Fig. 2) which had no other office than to add extra weight. This rim was taken from the pattern, reducing the weight of the cam nearly three pounds. (See dotted line Fig. 3). The strength of the cam [illegible] by this change. Similarly, the hub used in this was reduced in weight by cutting out three notches in the rim, as shown in Fig. 3.

A cast iron handle had always been placed on an adjusting screw on the same machine containing the cam and hub just described. The weight of this was one pound. A wire rod inserted in the screw served equally as well as the handle to turn it by, saving not only weight but also the cost of machining the handles. (See Fig. 4).

From the brief description given, it will be readily seen that a large amount of saving can be made both in weight

and cost of producing machinery. A careful inventory with this end in view will disclose this fact to any machine builder.

ENGINE EFFICIENCY CHART

IT is sometimes very convenient for an engineer to know the efficiency of his engine, and while this can be determined by calculation, if certain factors are known, the use of a table or chart works to better advantage. Tables, however, while possibly more accurate than a chart, are often contained in books and entail loss of time searching for the desired information; for this reason the accompanying chart has been prepared to assist in finding the efficiency of an engine by the simple application of a rule, or perhaps a piece of thread. By placing the straight edge against two known values, the third can be found on the corresponding scale. Thus, if the indicated horse power (I.H.P.) is known to be 20, and the brake horse power (B.H.P.) to be 10; the efficiency (E) will be 50 on the right hand graduated column. If the efficiency is known to be 80 per cent. and the rating of the engine to be 200 I. H. P., the B. H. P. will be found to be 160 on the middle scale. Formulae for calculating the different values are found on the chart.

GASKET MEMORANDA

A THIN gasket is best where joint surfaces are smooth, and is less likely to blow out than a thick one.

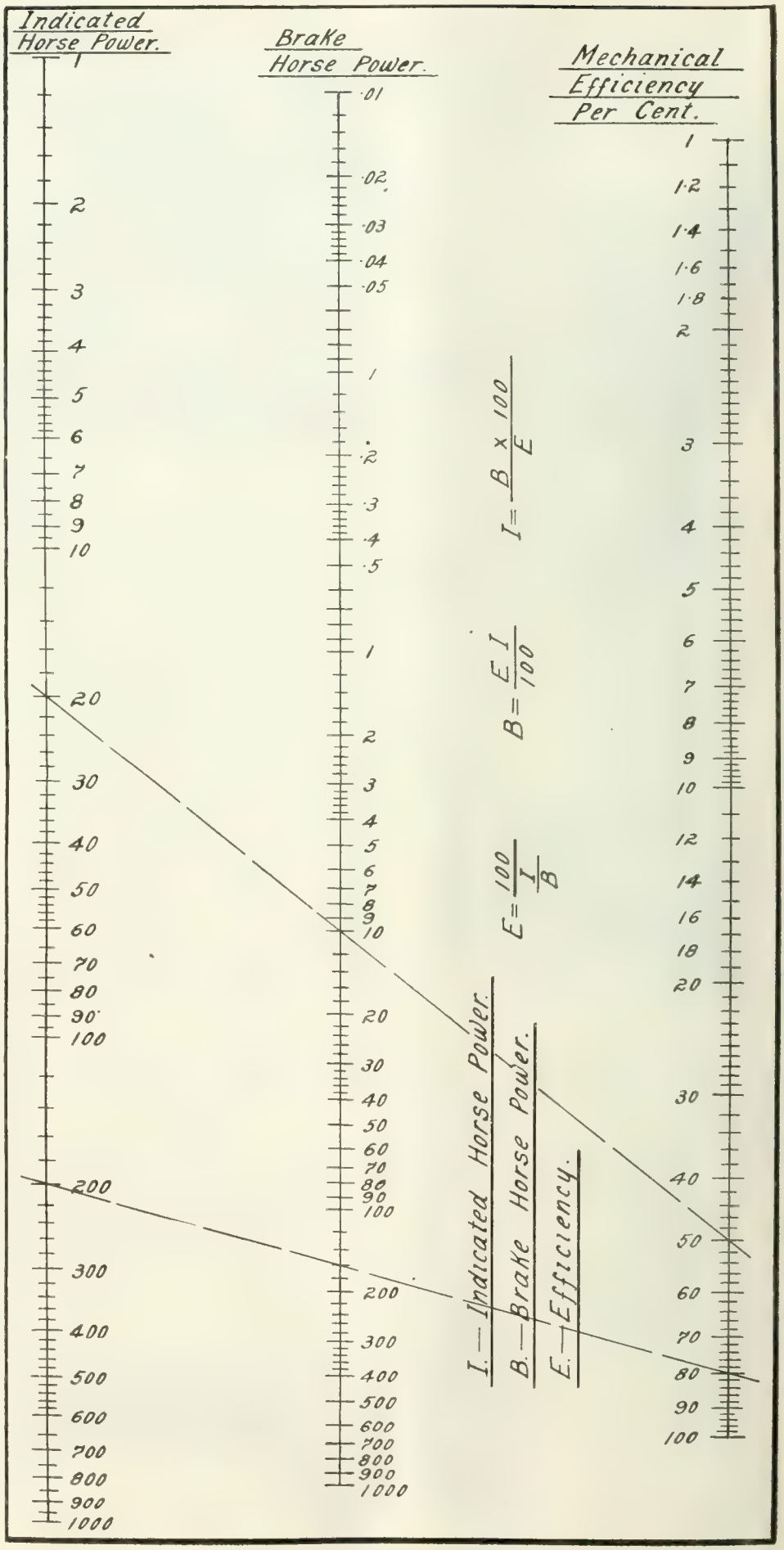
Gasket seats should be well cleaned and pieces of old gasket removed before placing the new gasket in position.

When installing a gasket, the object should be to apply, when setting up on it, an even, well-distributed pressure over as large a part of the surface of the gasket as possible. Nuts should not be set up too tightly in the beginning, but should be followed up as found necessary to prevent leaks when the steam pressure rises.

Cases have been experienced where handhole plates were set up so tightly with a long-handled wrench that the new gasket was mostly squeezed out of the joint and its structure torn in places. These small crevices or torn places form small openings, through which steam soon leaks, and the only remedy is to replace the gasket which has been ruined.

Gaskets with too wide a flange surface, or carelessly put in place, may project too far beyond the edge of the joint and jam the handhole or manhole cover at that point, so it cannot be set up or made to seat properly.

Gaskets of compressed fiber sheet are likely to tear when the joint is broken and to leave pieces of the old gasket sticking to the metal. These often form high spots which are easily overlooked, and likely to cause leaks and the condemnation of new gaskets which are not faulty.



ENGINE HORSE-POWER EFFICIENCY CHART.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions—Your Co-operation is Invited

BALL BEARINGS

THE article by C. T. under the above caption, while containing some truth regarding their applications, also gives information which is rather misleading. It is true that the average ball bearing salesman is an enthusiast, for the simple reason that he is in close touch with developments and has seen the wonderful improvements made possible in machinery by their use.

Your correspondent expresses a doubt regarding their use in a ship's tunnel, for the propeller thrust, neglecting the fact that they have been successfully used for this purpose. The steam-electric driven ship, "Majolner," being so fitted, the bearings naturally being carried in protective housings to prevent the intrusion of dirt, besides this the American and British submarines are fitted with ball bearing thrusts for propellers as well as for various parts of their mechanism.

I do not believe that the average engineer is a cautious, skeptical person, but that he is open to accept a new development if he can be shown good reasons for its use.

Regarding the application of ball bearings for dusty places, the writer had one experience in a Toronto plant, where their repair bill amounted to several hundred dollars a month for motors, as it was an extremely dusty place the operators wearing masks, the dust, being a cleanser compound and very gritty, previously getting into the bronze bearings which were rapidly destroyed allowing the armature to drop on the field, burning them out. Ball bearings were installed, without any protective covering or lubrication and were successful for almost a year, which reduced their repair bill tremendously; but when a closed housing was used they ran indefinitely saving the enormous repair bills altogether.

Another case your correspondent will no doubt be familiar with is the "Dumore" and "A.R.O." grinders, which work in dusty and gritty places at high speeds, grinding to very fine limits of accuracy. The makers of these machines state that their development would have been impossible without high grade ball bearings.

As for heavy running loads mentioned in your article, no specific loads being stated, I would add that bearings having a shaft size of 9-in. carrying loads of 50 tons each are in successful use on certain classes of paper machinery.

What will no doubt surprise your correspondent more is the fact that the type "F" locomotives on the Swedish State Railways weighing 143 tons each and being one of the largest in Europe have twelve axle journals on engine, bogie and tender fitted with ball bearings, this being adopted after successful experiments on railway coaches.

This letter is not intended as a criticism of your correspondent's article, which no doubt was written in good faith, but is intended to correct the erroneous impressions given, which are apt to prevent advancement of one of the greatest engineering developments of our age, the modern high grade ball [illegible]

GORDON JANES.

Toronto.

DOES A PISTON STOP AT REVERSAL?

AS a connecting rod is not of "infinite length" I think Mr. Miller's argument falls down from the fact that, to arrive at his conclusion, he has to introduce a proposition that is impossible. The piston travels fastest as the crank is at right angles with the piston and slows down as it approaches the direct horizontal and again is accelerated as the opposite angle is approached. At the centre as the piston reverses its motion it must stop to make the return trip.

Also, if therefore the speed of the piston varies during each stroke, while the flywheel is in constant and uniform motion, it is not beyond the possible that at the moment of reverse motion the piston could and does stop.

W. K. MACLEOD.

Chilliwack, B.C.

SOME SCREW MACHINE POINTERS

By D. A. Hampson

IN THE Oct. 11 issue Mr. Williams criticises some of the statements made under that heading in the original article. I must agree with him in everything he says; there is no doubt that he knows automatic screw machine work and would be able to contribute pointers of his own that would be of value to the craft. But, in so far as his criticisms are concerned, he has overlooked the point.

The articles in a trade paper are published primarily for instruction—instruction for somebody. Each man who reads such a paper does it to learn more about his business; if he is a foundryman he naturally is more interested in foundry articles, if he is a draftsman he cares more about the articles that deal with design, or maybe he is a specialist against his will and wants to broaden out but has no chance on his present job which he must hold until he can land one in the broader field—it is only through home study, trade papers and the like, that he can get in touch with the work he longs to do. Then again there are the new mechanics coming along all the while, the boys—yes and girls—of today. All the articles that are cut and dried to the skilled men are a part of the open book of knowledge to them. They can find what they want to know in the trade paper, and perhaps nowhere else, and so it is that such papers publish over and over again matter which is stale to older men.

Returning to Mr. Williams' criticisms all I can say is that he is fortunate indeed if in running a battery of automatics he always has had operators who remembered and followed the instruction given them, who didn't try to grind or set a tool according to their own ideas when the boss was not around, if he has never had to run a machine to get out work long overdue when he knew that machine would be the better for repairs or adjustments, if he never has had to use tools or collets or drill holders that would be better scrapped which was impossible because the toolmakers were all busy just then and to get factory parts would mean a month's delay.

A centering tool preceding a drill is not an essential but it is a good thing. Mr. Williams says, "Suppose a drill pushes back." Then suppose a cut off tool pushes back. There is no good reason why we should have either but we do, and in the latter case if the tool does not cut off cleanly or if for any of the other reasons there is a tit left on the end of the bar, then it has got to be a relatively large drill, short and stiff, in a machine whose moving parts are in almost perfect condition if that drill doesn't run off center some of the time. The centering tool is the sure cure for such troubles and in any case is good screw machine practice. To prove that it is not absolutely necessary, I have a machine that for thirteen months has been drilling 3/32 in. holes ⅜ in. deep in steel without a centering tool making 1200 pieces per day per spindle, but I freely admit that we loose some pieces and that it would be better practice the other way, and it would be so done but for certain conditions.

There are few of the little pointers of our business that will not bear calling attention to at regular intervals. How often do we hear good mechanics answer. "Why yes I know that, but it had slipped my mind, you see there are so many thousands of details in our business that a man can't help getting rusty on some of them?" Screw machine operators are too human to be exceptions to the rule. Particularly in the last few years have executives been forced to get along with green help and it is folly to suppose

that each and every one of them has received instruction down to the last minute detail and to suppose that they followed it to the letter. There was a machine screw company in New Jersey —a modest one, making cap screws mostly, with an investment in machines running into six figures—which prospered up to three years ago when three-fourths of their operators were won away by the high wages offered by near-by powder mills. During the "reconstruction" period the company failed, due entirely to the losses from new hands, even though they were tutored by the original foreman whose ability was undoubted.

ERRATUM

REFERRING to the article. "Transmission Sheet Data Chart," appearing in last Week's issue of Canadian Machinery, an error was made in the formula giving the final speed of a compound drive. The formula as shown is $F = \frac{R\,D\,D^{1}\,D^{11}}{r\,r^{1}\,r^{11}}$ and should be $F = \frac{R\,D\,D^{1}\,D^{11}}{d\,d^{1}\,d^{11}}$ the same as that appearing in the last section of the chart insert.

HARDNESS OF METALS

IN a paper recently read before the Institute of Metals in England, Professor T. Turner said that the definition of hardness which he preferred was that it is the property whereby a body is able to penetrate another body, and conversely the property whereby a body itself resists being penetrated. This does not differ materially from the definition proposed by Osmond in 1892 that hardness is "resistance to permanent deformation." Sir Robert Hadfield's definition is simply "resistance to deformation."

From the mechanical aspect hardness, as so defined, will closely correspond with the "yield-point" or "breaking-down point" of the material. In ductile materials, such as relatively pure metals, of which mild steel is an example, the yield-point is often roughly proportional to the ultimate tensile strength; in such cases the hardness, as measured by the stress per unit of area required to produce penetration is less than, but varies with, the tenacity. In brittle materials the yield-point and ultimate strength are practically identical; in such cases tenacity and hardness will nearly coincide. The hardness may, however, exceed the tenacity, since in a tensile test the particles are drawn away or separated from each other, while in a penetration test there is a certain amount of "backing" in the material which tends to support the penetrating body.

Penetration Tests

With penetration tests, such as those of Brinell, in which an appreciable quantity of metal is displaced, the true hardness is not obtained, since the displaced material becomes more or less work-hardened, and another similar test on the same spot will not give the same result, though the difference may not be large. In wearing tests the polishing and consequent hardening of the rubbing surfaces on the one hand, or their disintegration on the other, may lead to quite erroneous conclusions. The conception underlying the Brinell test is simply that a unit of surface will just maintain a stated pressure before being deformed. So long as the amount of deformation is not excessive, and provided the body tested is not brittle, the Brinell hardness number closely corresponds with true physical hardness.

For many purposes, however, the engineer does not really require hardness, though he asks for it. What he does desire is resistance to wear, or to deformation, or some other property or combination of properties which are of importance for the particular purpose he has in view. Thus in a wearing or grinding test it is necessary, if the metal is not to wear away quickly, (1) that the particles on the surface shall not be readily displaced, and (2) that the particles so displaced shall not be readily removed. Substances which are really hard do not permit of their particles being readily displaced—hence they wear well. Plastic metals do not permit of their displaced particles being readily removed—hence they too may give good wearing surfaces, though they are really very soft.

Effects of Alloying

If attention were confined to the pure metals in their cast, annealed, or unwrought condition, the question would be much simplified, for the hardness varies inversely as the atomic volume. In other words, the hardness increases as the number of atoms in a unit space increases. But for the majority of purposes pure metals are too soft, and must be hardened (1) by alloying, (2) by cold working, or (3) by chilling. The last may be regarded as a combination or variation of the first two methods. It may lead to the setting up of internal strains, which really produce the effect of cold work; or it may change the chemical composition of an alloy by causing some constituent to remain in solution, or even prevent a constituent from going into solution. The hardening of steel, and the softening of certain bronzes, by chilling, are examples of this effect on internal composition. Ultimately, therefore, metals or alloys can be hardened only by a change of composition or by strain.

When to one metal is added another metal, or other element, and the product allowed to solidify, the result is a mixture, a compound, an eutectic, or a solid solution. The useful ductile alloys are, almost without exception, solid solutions. If a series of solid solutions be interrupted by the presence of compounds, or eutectics, these will be indicated by irregularities in the hardness and other physical properties, at such points as correspond with the end of the series in the respective cases. It is therefore possible to harden either constituent by the addition of moderate proportions of the other. At the same time the material becomes less ductile —in other words, more brittle. A point is frequently reached at which the tenacity can no longer be increased with safety, owing to the continued increase in brittleness, but the added metals do not necessarily diminish the ductility in their alloys at the same rate as they increase the tensile strength. With increased knowledge of the effects produced by relatively small additions of the less common metals to alloys, it is probable that a useful field will be opened for increasing their hardness without producing brittleness.

Effects of Cold Working

The effect of processes of cold working upon the mechanical properties of many metals and alloys is remarkable. The yield point and tensile strength are raised, while the elongation and reduction in area (or ductility) are markedly lowered. Further work put upon the metal causes it to fracture. By suitable annealing the material may be rendered soft and ductile as before. The material in its wrought state not only has greater strength, but is also harder than the original metal or alloy. But when that hardness is measured by different instruments, such as the sclerometer, the scleroscope, or the Brinell tester, it is not found that the values obtained are in agreement. Hence the hardness produced by cold working is different in kind from that resulting from the alloying previously discussed.

It might perhaps be assumed that rolling, hammering, or pressing a metal would render it more dense, and that the observed increase of hardness is due to such added density. But any change of density due to mechanical processes is far too small to permit of being explained on the principle of atomic volume. Further, as a matter of fact the change is ultimately in the opposite direction. The first result of pressure is to close up any pores, cracks, or blowholes, and thus to increase the apparent density; hence bars are usually more dense than the ingots from which they have been rolled. The subsequent effect of cold working is to diminish slightly but appreciably the relative density of the worked material.

If a solid crystal is under strain, as a result of which shear occurs along a plane of crystal symmetry, it is evident that at the moment the particles are pushed asunder and caused to slide upon each other they were clinging to each other, and were separated only with difficulty, and by what is usually called a "pull" of sufficient strength. The materials thus clinging to each other, and forcibly separated, were in a state of tension. It would therefore appear that the intervening layer of "amorphous" material cannot be in a normal or unstrained condition, neither can it be in compression; it must therefore be in a state of tension. When a bar of metal is in tension it becomes longer, and the extension is proportional to the stress

appear. But [illegible] becomes thinner as it elongates; so the extension must not be regarded as indicating any volume change. Yet doubtless there is a small, but nevertheless real, volume change when a bar is stretched or compressed. It is just as real as the expansion of a gas on reducing the pressure, though almost indefinitely smaller in amount. It is this volume change, due to tension, which leads to the observed diminution of density in wrought metals.

Theory of Work-Hardness

In the case of a metal or alloy consisting of mixed crystals differently oriented, strain leads to the production of a series of slip planes in each crystal aggregate. Adjoining areas, as viewed in a microscopic section, have their planes at various angles to each other, owing to the different arrangement of the component micro-crystals in each crystal aggregate. These planes, or thin films of amorphous material, may be regarded as being held in tension either by the rigidity of the crystal envelope (or cement), or by the mass of the unchanged material, or by both of these. But in ordinary mechanical processes, such as rolling, hammering, or drawing, deformation follows deformation, and planes are set up in many directions. These slip planes cross and recross each other, their direction being limited only by the necessities of crystal symmetry. A section thus shows a network of crossing lines, each of which is assumed to correspond with an extremely thin layer in tension. In such a section there is an intricate network, which is held together by tightly stretched strings or tapes, and supported by intervening, unaltered crystalline material. Remembering the great strength of a lattice girder, or of woven wire, it can be more readily understood how these extremely thin layers of amorphous material, all of which are in tension, are able to confer great tenacity and hardness upon a worked ductile metal. Since the whole of the crystalline material never is, and never can be, completely converted into the amorphous condition, it follows that there must be unequal hardness and unequal tenacity throughout the various portions of the worked-hard material.

BRITAIN'S INLAND WATERWAYS

By O. C.

IT is the stress of war that has made Britain recognize the value of her inland waterways and her transit facilities by water are now taking new forms and directions under the more direct management of the state. The Government has already made arrangements for more effective administration of some leading canals and yet at the same time it would be unreasonable to expect too much from an intervention which was probably intended more to avert bankruptcy and the suspension of traffic rather than to develop them immediately, though probably after the war something may be done to resuscitate the use of the canals as a cheap route to inland industrial centres.

It is not generally known that there are hundreds of miles of inland waterways in the United Kingdom and although perhaps many of them are now derelict and useless, judged by modern standards of commercial utility, there must remain a number which only require expert engineering and business attention to restore them to their former prosperity. They will be found to tap the natural resources of some countryside, collieries, and quarries and brickfields, which the modern railway has overlooked. Probably too, dock and transport charges might be considerably saved by a greater use of the canal systems radiating from the river estuaries: and since the advent of the motor boat of shallow draft there are even greater possibilities in the suggested linking up of the British canal and boat traffic with that of France and Belgium. There seems to be little or no reason why the canal barges should not pass quite safely across the narrow seas for many months of year, either under their power or by towing and navigate successfully the Belgian and French inland waterways, taking outward or homeward cargoes without transhipment. That is certainly a possibility of the future.

THE BLAZING TRAIL OF EXISTENCE

By W. Doolittle

THE throbs and thrills of life are but the volcanic sputterings of human energy, that which from time immemorial has been freely handed down to every breathing mortal. Have we not beaten paths across the wilderness wastes? Have we not turned the course of mad rushing streams, or leveled hills and mountains into cities and habitable places by great energetic endeavor? And are you one to sit and enjoy these accomplishments, or think that they are all for your own particular benefit? If you are not conscious of your own particular debt for these, it is only possible to believe that the soul and mind and body of you is firmly encouched in a shell, or you may be likened to a clinging vine, that must needs have artificial support and other's hands to straighten out your cramped and intertwining branches.

Do you not see or realize that above and below you are billions of rolling and swaying spheres, and the one on which you dwell, even though it is but a dot among them, and you a mere human speck upon that dot, that the place you occupy, even that small space, has a value? And during your occupancy you can make it worthy of your presence, worth something to yourself, worth something to those around you and to untold millions yet unborn. Do you not see how possible it is to rise with a bound, that advancement means progress, that the ills and inconveniences of life are to disappear when you shed your artificial cloak of timidity and fear, laziness and lethargy, and become an enlivened, enthusiastic, active human being?

It was a great event in the history of the world when prehistoric man met his first catastrophe; when lava streams submerged his mountain cave; when gale and wind upheaved both root and branch of his noon-day retreat; because it threw him on his own resources; woke his brain; started him to thinking on his own account; and, standing on the shores of time, he was converted from a lounging, loafing being into an earnest active man.

Effort Benefits

Throughout intervals of time, he and most of his kind have been benefited by just such changes. It was one of his number, no doubt, who phrased up the saying, "Courage can rise above disaster." And, though the world is not overpopulated with his type, yet it is for what few there are that the world moves, that the wheels of progress still revolve, and not for the particular benefit of those who live inactive lives.

To those who are slowly dying and wasting away with world-weariness; to those who are in doubt, who do not know which way to turn; to those who live in deadening environments, whose days are just an ordinary repetition of the day before; to each one of you unconscious, unstirred individuals, could you but once feel the scorch and heat of the star-spark of energy, become charged with it's great outflowing waves, this great world power is free—free to yourself, free to everyone, if you would but inject it once into the fibre of your organisms.

Turn the stone image of yourself into something useful. Step down from your pedestal base and defy each dark phantom with which you have long threatened yourself! Have you eyes? Let them gleam! Have you hands? Clinch them! Have you feet? Tread with them! Eyes, hands, and feet? Belt these to the wheels of energy! Tread on thorns if thorns are before you! Harden your muscles if these have become soft! Make your nerves tireless! Swing ahead! Don't wait to be pushed! No desert was ever crossed by a whiner; no boulder ever impeded determination. Remember, the length and breadth of the continent is yours, in which to achieve something useful, something on which your name can never die!

Too long a pallor has bedecked your cheeks; too long your eyelids drooped, your chin hung low. Too long, too idle you've lived! Up at some worthy task! UP and make your mark! Seek no longer the velvet clouds on which to ride! Choose instead the thunder's path and lightning's flash as a guide! Don't be a clinging vine or a soft-shell animalcule! Shun ease as a bridge of decayed timber, and dependency as a crime. Cut out your boasting and swagger, and don't be too dainty!

The book you make, the brick you lay,

the field you plow, the star you gaze at and study, becomes a part of you. Either attains your name, or contains your individuality. No longer is lost, no incessant and painstaking toil is wasted throughout abiding time; for you put yourself in it when you work in it. It becomes a part of you, and you become a part of it. Strength yields strength, and power yields power.

Do You Respond?

The most distressful thing in life, the most sad thing, is that of a human being, who, between the cradle and the grave, has put no impress on the blazing trail of his existence. Spend not a day in vain! Call unto yourself each morning like an echo sweeping across a mountain as you rise from your slumbers, to grasp again determinedly the thing you left uncompleted the day before! Call unto yourself from your slumber chamber the need of yourself in the great world's work! Are you ready? Are you willing? Are you determined? Be not afraid, Soul of whoever you are, to tackle greatness and grandeur; to strive for the things you most humanly wish for! Be not afraid to delve to the very core of the earth; to explore ocean beds or speed in infinite space above! Whatever you do, wherever you labor, don't dream, don't grope, neither lean or lag!

Work intelligently and carefully! Take pains and do the best you know how! Practise, and practise, and practise! Repetition is the secret of skill and knowledge. There's a chance for improvement in every task in life. There is always something that can be made better than it already is. Hate that existence which brings no good to you! Despise that life which has no pure and active purpose in it! Be not afraid of sweat or dirt; nor if grime and grit ensoil the brow. Work hard and faithfully on the things that you will have carefully beforehand thought out! Make yourself better! Make the things around you better!

Subject each thing, each detail at hand, to a close scrutinizing examination. Despise not little things for these alone can become great! Know first what you wish to do, and then, do it with all your might and main! Cast to the four winds the desire for flabbiness, the easy life! Become clothed with energy, with determination, with vigor and vitality! Man's source of energy is inexhaustible. Every forward move, every undertaking, be it great or small, is simply energy generated into muscular and mental effort. A gripping hand is an energized appendage, as is also an alert mind, or a penetrating eye. The more of this you expend, the more you achieve and the more result you accomplish. The wise expenditure of this force turns man into a highly organized superior being.

WOMEN'S MUNITION WORK

A SERIES of exhibitions, illustrating the manufacture of munitions in French and English factories, the uses to which be felt that ultimately they will be able they are put in warfare at sea and on land, and the work of naval aircraft, submarines, destroyers and other warships, has been given recently throughout Great Britain by the Technical Section of the Labor Supply Department of the Ministry of Munitions, and have proved so attractive to the general public that they were recently reinforced by the Ministry with new features of popular interest.

In order to demonstrate more clearly the uses to which women's work is being put a number of completed articles are now shown of which women have made a considerable part. Thus, in the exhibition proper are a large number of parts of the Clerget engine, made entirely by women; and what these amount to in relation to the entire mechanism is illustrated by the exhibition of a complete Clerget engine, lent by the Air Board. For the same purpose complete Stokes guns, Vickers machine-guns, and Service rifles are shown, and where the articles are too large to be brought into the exhibition they are represented in many cases by photographs. As a sample of the tangible results that are being obtained by the work of munition makers a small collection is likewise shown of captures from the enemy. The Air Board has lent two of the latest German aeroplane engines, a Benz and a Mercedes, taken from machines brought down in the British lines with the engines uninjured; and the War Trophies Committee have provided a captured German field gun, a trench howitzer, and two machine-guns.

Optical Work

The exhibits are divided into 15 groups, the optical munitions being now separated from the chemical and surgical glass ware. The exhibits of optical work include everything that enters into the manufacture, from the crude lenses and prisms to the finished instruments. They are now accompanied by some interesting and instructive notes on the work involved. The work done by women in optical factories, where before the war only a few were employed, and these only in one or two factories, now includes every process in the manufacture of optical parts. The accuracy required, not in special laboratory instruments, but in those that are used for daily gun and field work and have to be turned out in large quantities, is perhaps the highest demanded of any industry. Lenses, for instance, are ground to a maximum error of about 0.00003 in. over their entire surface, and even this error has to be distributed uniformly from the centre of the lens to its periphery. The angles of prisms, again, have to be finished in most cases to an accuracy of five minutes, or for a small prism to a limit of anything from 0.0003 in. upwards. In special cases even higher accuracy is required. Women are said already to bring this work well up to the finishing stage, and when the relatively short apprenticeship they can have had is considered, no doubt can to do even the final working which now is done by highly skilled men. In making, finishing, dividing, and engraving the metal parts women are employed as they are in other exact mechanical work; and they also carry out the accurate optical measurements and tests and the very delicate adjustments that are required in the final assembly of the optical parts.

The exhibits of glass-blowing work contain several fresh examples of considerable interest. These include some electric lamp bulbs, which women are now blowing direct from the furnace in the glass-house, protected against the high temperature by screens. For some time they have done the dividing and engraving of tubes for clinical thermometers; and examples are now shown of the finished instrument, made by women complete. The complexity of the work they are doing is further illustrated by some large X-ray tubes.

Aircraft

Another highly important branch of work in which the exhibition shows women to be practically covering the whole field of manufacture is that of aircraft, represented in the three groups of engines, metal work, and wood-work, and in part of the group of internal-combustion engine accessories. Still fuller particulars than before are given of the manufacture of the engines, in which there is little that women are not doing, and perhaps nothing that they could not do if it were entrusted to them. Of the metal fittings a great variety is shown, 74 of which were made in a women's shop under women's supervision, including marking off from drawings and making scribing templates where necessary. These include not only individual details, welded, bent, and machined, but complete parts of the structure, such, for instance, as the rear skid, of which women not only make individual details such as the level, post, shaft, stays, cross members, and runner, but assemble all the components complete under the supervision of a woman.

In the woodwork section the exhibits indicate no less proficiency in women. Ribs for Maurice-Farman biplanes are said to be made by girls after a few days' instruction at the rate of eight per day, not including varnishing and drilling the holes, which is done by girls on 20 ribs at a time clamped together. A series of excellent photographs supplement two specimens of propellers, and show women doing every operation on their manufacture down to the final balancing.

Miscellaneous

The remaining groups of exhibits include "tank" and motor-lorry engines, accessories (in which very interesting particulars are given of the manufacture of magnetos by women), steam-engines, guns and components, small arms (mostly machine-guns), tool-room work and gauges, drills and cutters, etc., punches and dies (with jigs, chucks, test pieces, etc.), projectiles and trench warfare,

(Continued on page 469)

PROGRESS IN NEW EQUIPMENT

There is Here Provided in Compact Form a Monthly Compendium of Shipbuilding and Marine Engineering Auxiliary Product Achievement

NOVEL FOUR SPINDLE AUTOMATIC SCREW MACHINE

THE machine shown in accompanying engravings embodies a double bed construction involving use of a top and bottom bed, the top bed carrying the cam shaft, drums and all the working parts together with the driving pulley. This radical change results in there being no working parts on the bottom bed whatever.

The tooling system adopted may be classed as being of the open type. Double decked forming slides are provided, there being one forming position and one cut-off position at front and two forming positions on the back slide.

The cutting-off is performed on the upper front spindle. The work drops into a shoot which is not shown, and separates into a receptacle directly in front of the motor. The chips drop directly into the chip storage below, and the oil drains into an oil pan below the chip storage. The chip pan is made open at the left hand end so by having a receptacle at the left of the machine directly below the bars where it does not take up any extra room, the chips can be removed at any time without stopping the machine, and the operator is not interfered with.

By cutting-off on the top spindle it is easy to separate the work, and it brings the heavy forming and heavy turning on the two lower spindles where the greatest volume of chips are made; thus the two top spindles are used for the sensitive tools such as drilling, threading, reaming and cutting-off. On the two top spindles there are very few chips to pile on top of the lower ones with this method of laying out the machine. The turners and drill holders are mounted on a slide which carries the turning and drilling tools for the two bottom spindles.

The upper front tool holder as shown in the engraving is arranged for an independent feed, and the upper back spindle as shown is arranged for high speed drilling with a high speed drilling attachment and works independent of the lower slide, that is, two sets of tools on the bottom slide work together in pairs, and the two upper tool holders are operated separately or together. This makes a very flexible combination and the overhead camming makes it very convenient to operate the tools independently. Either vertical or circular forming tools can be used without changing the cross slides.

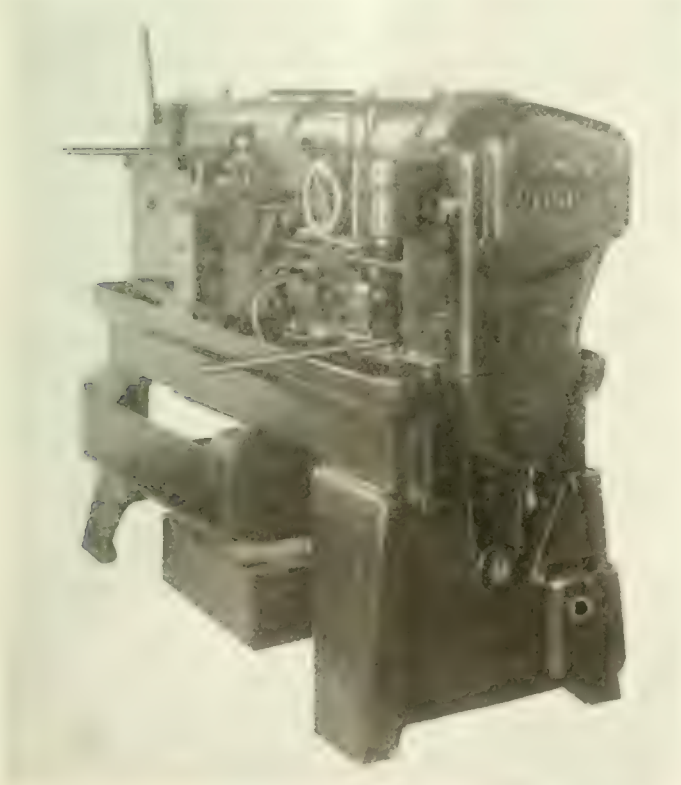
The spindle carrier is held in two housings, and is provided with adjustable bushings for the spindles. The spindles are hardened, heat treated and ground and are fitted with draw-back collets and the regular type of stock feeding fingers. All of the spindle bearings together with the stock feeding parts are entirely encased. The change gears for both power feed and driving are covered by a door at the right end of the machine and are easy to get at so that quick changes can be made without loss of time.

The motor is mounted directly under the bed and is arranged with an elevating base to take up the belt which runs directly through the bed of the machine and the right end housing, thus, the motor and belt are protected from oil. In all cases the levers come within easy reach of the operator and both the forming and tool slides have hand return which is only used when setting up the machine as these levers are removed when the machine is in operation. The oil pumps are below the supply so they do not need priming and they are of the gear type.

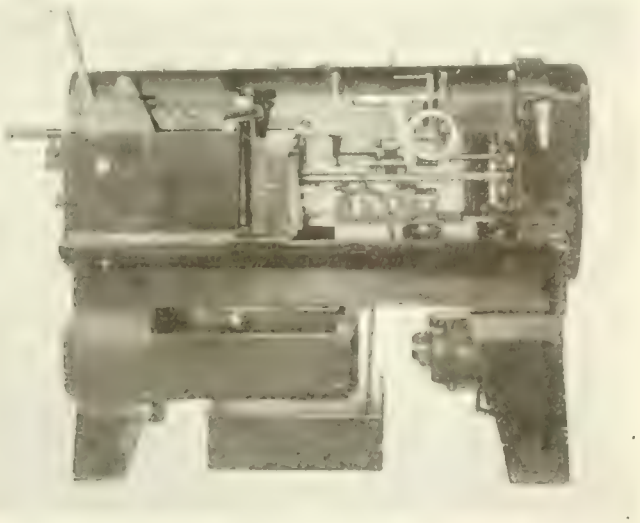
This machine is a recent product of the Cone Automatic Machine Co., Windsor, Vt.

CRANK PIN FORMING LATHE

THE machining of crank shafts is a branch of machine work which in recent years has attained peculiar prominence in view of the ever-increasing output of motor vehicle engines and lately of aeroplane engines. Practice varies in different countries to some extent, and the accompanying engravings, which illustrate an advanced type of English machine, are of interest in view of the stress under which engine builders there have been operating for some time. The illustrations, for which, along with the particulars, we are indebted to "Engineering," show a single-pin forming machine, which is capable of dealing with a crankshaft of which the length measured over the outside webs of the outer cranks, plus the length of the longest end, does not exceed 4 ft., and of such dimensions that it will swing in a circle 20 in. in diameter. The height of centres is 18 in. and the hole in the spindle is 21 in. in diameter. The machine is intended to finish the crank-pins and down the sides of the crank-webs, the main journals of the



VIEW SHOWING LOCATION OF MOTOR AND BELT DRIVE.



FOUR-SPINDLE AUTOMATIC WITH DOUBLE BED CONSTRUCTION.

shaft having been previously finished to size.

As will be seen from Figs. 1 to 4, the design of the bed is very substantial, and has the cross-slide cast solid with it. At the end of the bed is fixed an extension piece, of closed-box section, on which the loose headstock is mounted. The driving head is arranged so that the machine can be driven either by belt or by a constant-speed motor, the power being transmitted through steel gear machine-cut from the solid, and the final drive to the spindle being through a pair of double-helical gears. Six changes of speed are provided, only those gears which are actually transmitting power being in mesh. The changes of speed are controlled by the upper left-hand lever and the hand wheel seen on the front of the machine in Fig. 1, while the power cutting feeds to the tool slides are regulated by the lower left-hand lever shown in the same view. The feeds provided for are four in number.

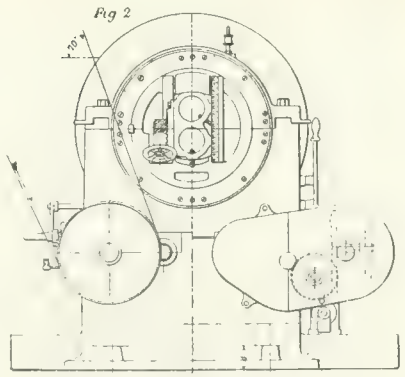


FIG. 2

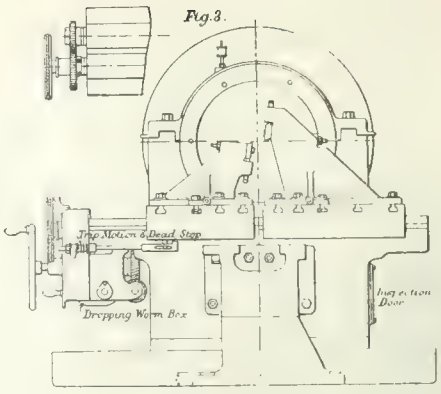


FIG. 3

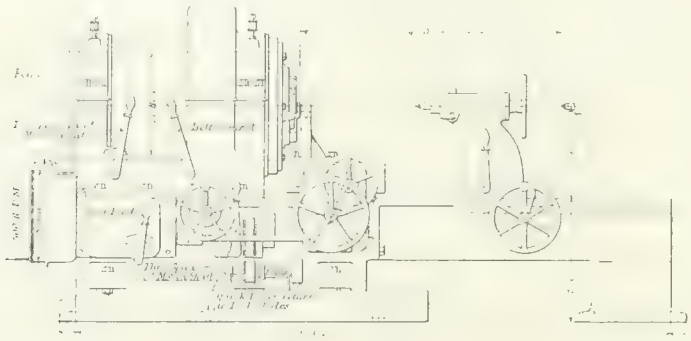
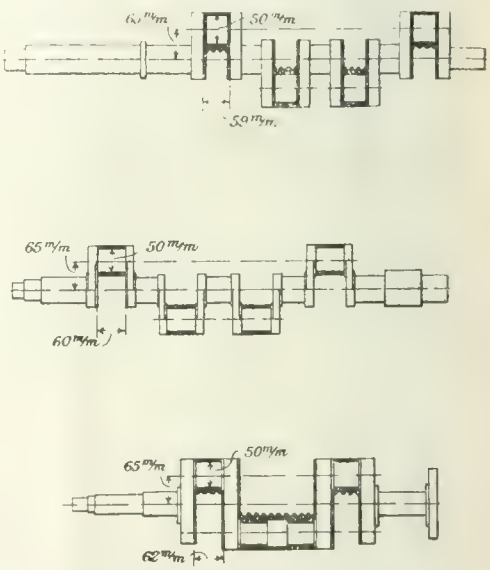


FIG. 1.

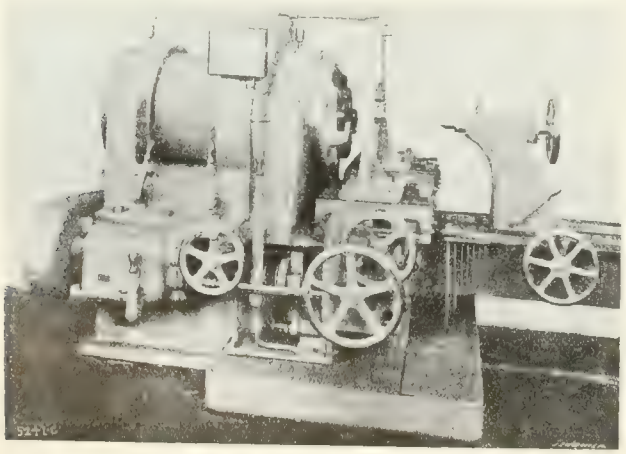
A special feature of the design is that the two tool slides are operated simultaneously. When the pin being operated upon is approaching its final diameter the front tool is put out of gear and the back finishing tool finishes the pin. By this means much time is saved as compared with the usual practice of employing only one tool at any time. The tool slides are arranged to trip automatically at predetermined positions when the final diameter is controlled by hand-feeding the finishing tool to a dial indicator. In practice it is found quite possible and easy to finish a pin to any given size, and, if necessary, to reduce the diameter of the work with precision by as small an amount as 0.001 in. To avoid the really hard labor and loss of time involved in winding back the heavy tool slides, a quick-acting power return motion is fitted, this motion being controlled by the lever marked in Fig. 1. As will be seen from Fig. 3, the two tool posts are firmly bolted down to the carriage slides, and the whole design is very rigid. The movement of the slides is effected by large-diameter screws made of high-carbon steel fitted with long phosphor-bronze nuts.

Inside the main drive or spindle there is mounted a sliding head carrying an adjustable work-holder, adapted to receive the end of the crankshaft which is to be machined. This work-holder, which will be seen in Fig. 2, is under control by a hand wheel with pointers showing the correct position for any throw of crank. On the front of the drum is mounted another adjustable work-holder, also provided with pointers to show its correct position. This latter work-holder grips the main bearing or pin of the crankshaft which happens to be next that which is to be machined, while the loose headstock supports the outer end of the crankshaft. The crankshaft is thus held in two bearings and supported at the end, while the drive is transmitted close up to the cutting tool.

Splash lubrication is provided for all the main driving gears, while the main bearings of the spindle are fitted with sight-feed lubricators, and the other bearings of the driving mechanism with ring lubricators. A complete self-contained pump and tanking system is provided to ensure an efficient supply of lubricant on the work. This lathe is constructed by Thomas Ryder & Co., Ltd., Bolton, Lancs.



TYPES OF CRANK SHAFTS OPERATED ON.



CRANK PIN FORMING LATHE

HIGH POWER 14 IN. LATHE

WITH the object of providing a lathe embodying features which render it suited for either manufacturing or tool room use, the American Machine Tool Engineering Works, Chicago, Ill., have developed the 14 in. high power lathe illustrated in the accompanying engraving. Simplicity, rigidity, and accuracy are features which have received special attention.

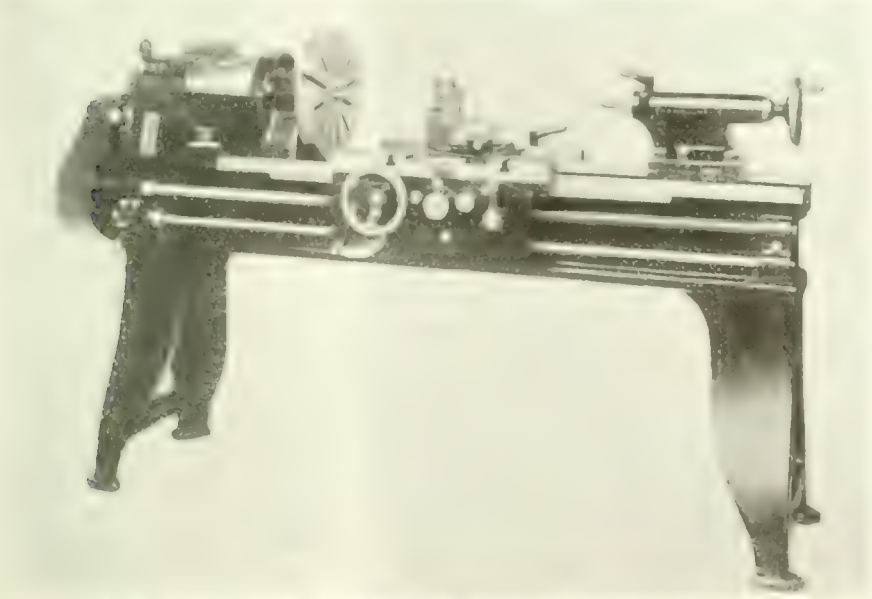
The headstock is of the bowl type, and carries a 60 point carbon, crucible steel spindle, having a front journal 2 7/16 in. dia., by 4 in. long, the rear bearing being 1⅞ in. dia., by 3 in. long. Bronze bearings are fitted to the spindle, which has a 1 5/16 in. hole throughout its length. The drive is through a three-step cone pulley, with double back gearing with a maximum ratio to the spindle of 8 to 1. The lever for shifting the

back gears is within easy reach of the operator; headstock spindle is of steel, and idlers are bronze-bushed.

The bed is of ample depth to insure perfect rigidity under the heaviest pull taken by the belt, and the carriage has a bearing of 23 in. on the vees. The compound rest is unusually large.

A feature of the apron is the provision of a feed change lever with four locations by means of which a similar number of feeds can be obtained, either cross or longitudinal, this device being distinct from the customary feed reverse lever. The apron is cast in one piece with integral bearings. The feed is driven direct from within the headstock by a train of gears, provided with an overload friction device to provide slippage and avoid damage by accident or otherwise.

The tailstock is fitted with an extra-long spindle, 1¾ dia., and having a travel of 8 in., giving great rigidity, allowing of deep holes being drilled without bringing up tailstock. No. 3 Morse taper centres are fitted.



14 IN. HIGH POWER LATHE WITH 16 R FEED CHANGES IN APRON

When desired the lathe is equipped with pan bed, taper attachment, draw bar and collets. When so constructed it becomes a desirable tool room lathe possessing remarkable flexibility. When needed for gauge making it will be found to possess all that may be desired for this class of work. This not only applies to plug and ring gauges but thread gauges as well. A sufficient quantity of change gears are furnished with the lathe, making it possible to cut a large range of threads and from 2 to 48 per inch. When desired it can be furnished with metric lead screw and change gears for cutting metric threads from 1 to 7 millimetres.

The lathe swings 14⅝ in. over the vees; swings 7 in. over carriage; takes 36 in. between centres with 6 ft. bed; and weighs 1,600 lbs. Regular equipment consists of double friction countershaft; steady rest; large and small face plate; wrenches, and necessary change gears.

OCEAN FREIGHTER LAUNCHED

THE ocean going cargo steamer, Tento, was launched at the Polson Iron Works, Toronto, on Monday, October 22. The Tento, which was ordered by Norwegian interests, was christened by Mrs. Andre Refnes, wife of the Norwegian captain who will command the ship. The principal dimensions of the vessel are as follows: Length 261 feet, breadth 43 feet 6 inches, depth 23 feet, deadweight capacity 3,500 tons, mean draught 19 feet 6 inches. She is of the single deck type; is built on the deep frame principle, with cellular double bottom all fore and aft, and peak tanks; has four watertight bulkheads, two masts, and is equipped with six steam winches—one at each mast and derrick, steam and hand steering gear, electric light, evaporating outfit, etc. The propelling machinery consists of triple expansion engines having cylinders 20½ in., 33 in. and 54 in. diameter by 36 in. stroke. Steam is supplied by two Scotch marine type boilers, each 14 feet diameter by 12 feet long. Each boiler has three corrugated steel furnaces of 42 inches diameter.

WOMEN'S MUNITION WORK

(Continued from page 466.)

and general engineering (including pneumatic and machine tools). An interesting exhibit in the small-arms group consists of details of the Vickers type of automatic machine-gun. These were made at a works that before the war had never done machine-gun work. The bulk of the machining is done on milling machines worked exclusively by women. About 70 per cent. of the drilling machines and capstan lathes are also worked by women and the remainder by boys. The machining is done to very close limits, so as to reduce the bench work to little more than removal of burrs; and of this about 40 per cent., together with the whole of the gauging and a large and increasing part of the tool-setting, is performed by women.

The catalogue which was received so favorably at the Leeds and Newcastle Exhibitions is continued in the same form as before. As will be remembered, it was not merely a list of exhibits, but also for most articles contained against each exhibit much valuable information as to the machines and methods used in manufacture. Considerable additions have been made to this information in the present catalogue.

Screenings

School Teacher: "Why is a certain part of the church called the altar?"

Tommy: "Because it's where people change their names."

Tommy: "I've got something wrong inside me stummick, sir. First it seems to come up, then goes dahn; then it goes up an' then dahn again."

M. O.: "Perhaps you've swallowed a lift!"—London Opinion.

On the Western plains the sheepman goes out with several thousand head and one human companion. The natural result is that the pair, forced on one another when they least want it, form the habit of hating each other.

An ex-sheepman while in a narrative mood one evening was telling a party of friends of a fellow he once rode with "Not a word had passed between us for more than a week, and that night when we rolled up in our blankets he suddenly asked:

"'Hear that cow beller?"

"'Sounds to me like a bull,' I replied.

"'No answer, but the following morning I noticed him packing up.

"'Going to leave?' I questioned.

"'Yes,' he replied.

"'What for?'

"'Too much argument.'"

A tall, official-looking man with a notebook in his hand called on old Smith the other day and observed:

"Excuse me, Mr. Smith, but I believe you possess a little fox terrier with a black patch over his left eye?"

Visions of unpaid dog taxes burst upon Smith, but, being very stingy, he with great energy replied:

"Oh, no, naething o' the kin'. He is only a puir stray dog that followed me hame. He disna belang tae me ava'."

"Is that so?" said the stranger. "That is all right, then. Only our client, Mr. Macdonald, accidentally shot the dog this morning, and I came round to compromise the matter by offering you ten pounds, but, of course, if he is not your dog—well, good morning."

And old Smith could not refrain from kicking himself.

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A weekly newspaper devoted to the machinery and manufacturing interests.

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Vol. XVIII. OCTOBER 25, 1917 No. 17

EFFICIENCY AND EFFICIENCY EXPERTS

AMONG the numerous war-born problems is one which is receiving increasing attention as these troublous times approach a climax—one which received more or less desultory consideration in pre-war days, and which in the strenuous days of post-war competition will receive, must receive, ever-increasing devotion from those who hope to maintain the industry of the country on an equitable basis under the stress of international competition.

About few phases of modern industry has there been so much written, said, understood, and misunderstood as efficiency. Well might the Goddess of Industry exclaim, "Oh, Efficiency! what deeds have been perpetrated in thy name!" Few factories and business establishments but have been "through the mill" at the hands of an efficiency expert, and few of them indeed but could have achieved similar, if not frequently surpassing, results by the application of home talent. But, because of the fact that the truth is always unpleasant, home talent, like the time-worn prophet, is generally at a discount, and it is much pleasanter and less humiliating, likewise much more fashionable, to have the truth unearthed and served up in the form of a so-called efficiency report than to admit to one's subordinates that things have not been run properly.

Experts! their name is legion. Possessed of analytical minds and intellects of high penetrative power, they have, as a result of legitimate effort and commendable success on the part of the few, assumed unto themselves powers of diagnosis bordering on the uncanny. One of the species will enter a plant, observe the rate of lift at which a crane operates, decide that it could lift at twice the speed and save so much time resulting in twice the work, etc., **quod erat demonstrandum.** So many dollars being lost every time the crane lifts anything at the old speed! Against this hypothetical leak must be set the increased stress under which crane operator and equipment will be placed, increase in accidents involving possible damage to employees and work in progress and the old adage, "the more haste the less speed" will doubtless appear behind the maze of alterations and speeding up suggestions which fill the report presented to the management.

Another phase of the subject is the manner in which the expert deals with the respective services of various officials of the plant. When it is remembered that an exhaustive report on a plant will cover everything from the activities of the floor sweeper to the policy of the management,—and from the color and style of the letter head to the shade of the window blinds, the official is indeed fortunate whose efforts are not criticized to some extent. And it is just at this point that experts become inexpert. If the investigation has been conducted in an open and above board manner, the plant officials notified of its objects and their co-operation as loyal employees secured in a frank, sensible manner, the firm is indeed fortunate, and is assured of maximum benefit. The expert, if worthy of the name, finds his task lightened enormously. Many plans are brought to light, which for various reasons have been held back by different officials. He becomes the melting pot into which years of experience pour their mature reflections, and if, by great good fortune, and this is the important "if," he has had personal experience in the same or an allied line as the plant in question, all concerned may well bless the day when he commenced his task.

Such, however, is the ideal. The real, unfortunately, is far from approaching it in thoroughness and skilfulness, and nearly always terminates where it commenced or soon gravitates back to its former condition.

Efficiency, like Charity, begins at home. No man likes to be told that he does not know his business as well as he thinks he does, or ought to. It is much nicer, and more pleasing to his vanity to have the onus of things laid on others. Calling down employees is considered a necessary qualification by many executives, and the expert who finds the backlash in quarters where admonitions must be heard but not refused is sure to be supported in almost any system of reorganization short of a general upheaval.

The tragedy of the play is frequently staged in the superintendent's office. Brow-beaten and discouraged by an interfering principal who knows not when to leave well enough alone, the unfortunate recipient has allowed matters to take the line of least resistance, and it is comparatively easy for any pseudo-expert to make recommendations which should obviously have been put into practice long before.

On the other hand, the business which is run by men with ideals, who wish to be known by their work for themselves and those associated with them, who recognize the laborer as worthy of his hire, and that as we do unto others so will others do unto us, such a business has no room for another expert—it is already full up.

During the past three years many of our factories and business houses have run the gamut from extreme depression to overflowing, yes, fulsome prosperity. When times were bad they did not want efficiency experts. They had no money to pay them and no work to expertize. Now they have money they do not want to spend it on unproductive labor, but, are they any more efficient now than they were before? Have they not grown rich, some of them, in spite of themselves? Are they going to remain rich or what?

Time alone will tell, but to him who considers what his position will be when real competition comes, when each employee will be valued for what he can and can not do, when the faithful employee of years is repeatedly asked for his opinion and valued and remunerated because of his loyalty and ability, to such men the future will give its rewards, provided they recognize the opportunities of the present to set their house in order and use the ensuing interval as a period of introspection, in which efficiency is the keynote and every man an expert, the motto.

INDUSTRIAL NOTABILITIES

CHARLES EDWARD FRASER, B.A. Sc., president, Fraser, Brace & Co., Ltd., Montreal; president, Fraser, Brace & Co., New York; managing director, St. Maurice Construction Co., was born in Montreal, April 7, 1873.

He was educated in public schools, Montreal, and graduated from McGill University (Bachelor of Applied Science), 1899.

Supervised construction of a section of the first New York Subway, 1900-1901; also half of the construction of four tunnels for the Pennsylvania Railroad under the East

CHARLES EDWARD FRASER, B.A. Sc.

River, New York, 1904-1908. In 1908 established the firm of Fraser, Brace & Co., New York, which company have carried out a large number of notable undertakings.

In Canada: Intake section of the Canadian Light & Power Company's power development at Valleyfield, 1910-1911; construction of the Cedar Rapids hydro-electric development, 1913-1914. In the United States; Viaduct construction for the Pennsylvania Railroad, 1909; shaft and tunnel at Niagara Falls, 1908-1910; two hydro-electric developments on the Deerfield River, Mass., 1912-1913; construction of four miles of flooring on the Hell Gate Bridge, 1915-1917; construction of cantonment for the United States Navy, Philadelphia, 1917; construction of shipbuilding yards at Newark for the Federal Ship Building Company, 1917.

In 1914 the Canadian firm of Fraser, Brace & Co., Ltd., was established and have constructed a smokeless powder plant at Trenton, Ont., for the Imperial Munitions Board, 1917. Construction work now under way; Dam at La Loutre, Que., on the Upper St. Maurice River; a second power development at Cedar Rapids; four wooden steamers for the Imperial Munitions Board at Montreal.

Mr. Fraser is a member of the Canada Club and Engineers' Club; member Can. Soc. Civil Engineers; member Am. Soc. Civil Engineers; and in creed is Congregational. He married Helen Sweezy, daughter of Richard L. Sweezy, their family consisting of two sons and one daughter.

Mr. Fraser's residence is 466 Roslyn Ave., Westmount, Que.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	$46 95
Lake Superior, charcoal, Chicago	58 00
Standard low phos., Philadelphia	87 00
Bessemer, Pittsburgh	37 25
Basic, Valley furnace	33 00

	Montreal	Toronto
Hamilton	.....	.....
Victoria	.....	60 00

FINISHED IRON AND STEEL.

Per lb. to Large Buyers.	Cents
Iron bars, base, Toronto	5 25
Steel bars, base, Toronto	5 50
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	5 25
Steel bars, base, Montreal	5 50
Reinforcing bars, base	5 25
Steel hoops	7 50
Refined iron	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	7 00
Band steel, No. 10 gauge	5 75
Chequered floor plate, 3-16 in.	15 20
Chequered floor plate, ¼ in.	15 00
Staybolt iron	8 50
Bessemer rails, heavy, at mill	38 00
Steel bars, Pittsburgh	4 00
Tank plates, Pittsburgh	4 00
Structural shapes, Pittsburgh	4 00
Steel hoops, Pittsburgh	5 75
F.O.B. Toronto Warehouse.	
Steel bars	5 50
Small shapes	5 75
F.O.B. Chicago Warehouse	
Steel bars	5 00
Structural shapes	5 00
Plates	8 00

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs. C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35 1	45.5
Halifax	35 1	45.5
Toronto	18 9	22 1
Guelph	18 9	22 1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85 1

METALS.

	Montreal	Toronto
Lake copper	$31 00	$32 00
Electro copper	31 00	32 00
Castings, copper	30 00	31 00
Tin	63 00	63 00
Spelter	10 50	10 50
Lead	10 00	9 00
Antimony	18 00	19 00
Aluminum	65 00	62 00

Prices per 100 lbs.

PLATES.

	Montreal	Toronto
Plates, ¼ to ½	$13 00	$13 00
Heads	13 30	13 30
Tank plates, 3-16 in.	13 65	13 25

WROUGHT PIPE.

Effective July 5, 1917.

Size.	Black Per 100 feet	Galvanized Per 100 feet
Standard Buttweld.		
⅛ in.	$ 5 00	$ 6 50
¼ and ⅜ in.	5 12	7 16
½ in.	6 46	8 03
¾ in.	8 17	10 29
1 in.	12 07	15 22
1¼ in.	16 33	20 59
1½ in.	19 53	24 61
2 in.	26 27	33 12
2½ in.	42 12	52 94
3 in.	55 08	69 23
3½ in.	69 92	86 94
4 in.	82 84	103 00
Standard Lapweld.		
2 in.	29 23	35 71
2½ in.	43 88	54 11
3 in.	57 38	70 76
3½ in.	71 76	89 70
4 in.	85 02	106 28
4½ in.	96 52	121 29
5 in.	112 50	141 34
6 in.	145 90	183 36
7 in.	190 40	238 00
8 L in.	200 00	250 00
8 in.	230 40	288 00
9 in.	276 00	345 00
10 L in.	256 00	320 00
10 in.	329 60	412 00

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES.

4" and under, 45%.
4½" and larger, 40%.
4" and under, running thread, 25%.
Standard couplings, 4" and under, 35%.
4½" and larger, 15%.

OLD MATERIAL.

Dealers' Buying Prices.

	Montreal	Toronto
Copper, light	$19 00	$19 00
Copper, crucible	22 50	21 50
Copper, heavy	22 50	21 50
Copper wire	22 50	21 50
No. 1 machine composition	20 00	20 50
New brass cuttings	16 00	17 00
No. 1 brass turnings	15 00	15 75
Light brass	11 00	10 00
Medium brass	15 00	14 00
Heavy brass	16 00	16 00
Heavy melting steel	20 00	20 50
Steel turning	12 00	8 00
Shell turnings	12 00	12 00
Boiler plate	23 00	18 00
Axles, wrought iron	30 00	24 00
Rails	26 00	20 50
No. 1 machine cast iron	25 00	25 00
Malleable scrap	20 00	20 00
Pipe, wrought	15 00	9 00
Car wheels, iron	26 00	25 00
Steel axles	32 00	30 00
Mach. shop turn'gs.	8 50	8 50
Cast borings	15 00	8 50
Stove plate	19 00	19 00
Scrap zinc	5 00	6 50
Heavy lead	7 00	7 00
Tea lead	6 00	5 75
Aluminum	30 00	25 00

BOLTS, NUTS AND SCREWS.

	Per Cent.
Carriage bolts, ⅜" and less.	10
Carriage bolts 7-16 and up.	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less.	10
Blank bolts	net
Bolt ends	net
Elevator bolts	5
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd., brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex. blank	add 1 75
Nuts, hex. tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	17½
Boiler rivets, base ¾-in and larger	$8 50
Structural rivets, as above	8 40
Wood screws, flat, bright	72½
Wood screws, O. & R., bright	67½
Wood screws, flat, brass	57½
Wood screws, O. & R., brass	32½
Wood screws, flat, bronze	27½
Wood screws, O. & R. bronze	25

MILLED PRODUCTS.

	Per cent
Set screws	25
Eq. & Hex. Head Cap Screws	20
Rd. & Fil Head Cap Screws	net
Flat ⅞ But. Hd. Cap Screws plus	net
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. and semi-fin. nuts, over 1 in., up to 1½ in.	20
Fin. and semi-fin. nuts, over 1½ in., up to 2 in. plus	10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws, list plus	20
Collar screws, list plus 30,	10
Thumb screws	20
Thumb nuts	65
Patch bolts, add 40,	10
Cold pressed nuts to 1½ in. add $4 50	
Cold pressed nuts over 1½ in. add $7 00	

BILLETS.

	Per gross ton
Bessemer billets	$ 60 00
Open-hearth billets	60 00
O.H. sheet bars	70 00
Forging billets	90 00
Wire rods	85 00

F.o.b. Pittsburgh.

NAILS AND SPIKES.

Wire nails	5 50	5 45
Cut nails	5 70	5 80
Miscellaneous wire nails		60%
Spikes, ¾ in. and larger		7 50
Spikes, ¼ and 5-16 in.		8 00

MISCELLANEOUS.

Solder, strictly	0 36
Solder, guaranteed	0 33½
Babbitt metals	18 to 70
Soldering coppers, lb.	0 53
Lead wool, per lb.	0 15
Putty, 100-lb. drum	4 75
White lead, pure, cwt.	18 00
Red dry lead, 100-lb. kegs, per cwt.	15 45
Glue, English	0 38
Tarred slaters'-paper, roll	0 95
Gasoline, per gal., bulk	0 31½
Benzine, per gal., bulk	0 30½
Pure turpentine, single bbls., gal.	0 78
Linseed oil, raw, single, bbls.	1 42
Linseed oil, boiled, single bbls.	1 45
Plaster of Paris, per bbl.	2 50
Sandpaper, B. & A. list plus	20
Emery Cloth list plus	33 1-3
Borax, cyrstal	15
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 03
Rosin "G," per lb.	0 03½
Borax crystal and granular	0 15
Wood alcohol, per gallon	2 15
Whiting, plain, per 100 lbs.	2 20

ROPE AND PACKINGS

Plumbers' oakum, per lb.	.09
Packing, square braided	.34
Packing, No. 1 Italian	.40
Packing, No. 2 Italian	.32
Pure Manila rope	.39
British Manila Rope	.33
New Zealand Hemp	.33
Transmission rope, Manila	.45
Drilling cables, Manila	.41
Cotton Rope, ¼-in. and up	.47

POLISHED DRILL ROD.

Discount off list, Montreal and Toronto ..... net

CARBON DRILLS AND REAMERS.

	Per Cent.
S.S. drills, wire sizes up to 52.	30
S.S. drills, wire sizes, No. 53 to 80	net
Standard drills to 1½ in.	30
Standard drills, over 1½ in.	30
3-fluted drills, plus	10
Jobbers' and letter sizes	20
Bit stock	25
Ratchet drills	15
S.S. drills for wood	30
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks list plus	30
Bridge reamers	52½
Centre reamers	10
Chucking reamers	net
Hand reamers	10

COLD ROLLED SHAFTING.

At mill ..... list plus 40%
At warehouse ..... list plus 50%
Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, add 35%; B and C, plus 25%; cast iron, net; standard bushings, 25%; headers, 60; flanged unions, 5; malleable bushings, 30; nipples, 45; malleable lipped unions, 40.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$11 00	$10 50
Sheets, black, No. 10	12 00	12 00
Canada plates, dull, 52 sheets	12 00	12 00
Canada plates, all bright	12 50	12 50
Apollo brand, 10¾ oz. galvanized	12 25	12 09
Queen's Head, 28 B.W.G	11 75	10 75
Fleur de-Lis, 28 B.W.G.	11 75	10 75
Gorbal's Best, No. 28	12 00	10 25
Colborne Crown, No. 28	11 25	10 00
Premier, No. 28 U.S.	13 75	10 95
Premier, 10¾ oz.	13 85	11 25
Zinc sheets	20 00	20 00

PROOF COIL CHAIN.

¼ in.	$12 00
5-16 in.	11 50
⅜ in.	11 15
7-16 in.	10 90
½ in.	10 70
9-16 in.	10 70
⅝ in.	10 50
¾ in.	10 40
@ in.	10 25
1 inch	10 10
Extra for B.B. Chain	1 20
Extra for B.B.B. Chain	1 80

ELECTRIC WELD COIL CHAIN B.B.

¼ in.	$15 50
3-16 in.	11 70
¼ in.	8 40
5-16 in.	7 40
⅜ in.	6 35
7-16 in.	6 35
½ in.	6 35
⅝ in.	6 35
¾ in.	6 35

Prices per 100 lbs.

FILES AND RASPS.

	Per Cent.
Globe	50
Vulcan	50
P H and Imperial	
Nicholson	40
Black Diamond	40
J. Barton Smith Eagle	50
McClelland, Globe	50
Delta Files	37½
Disston	50
Whitman & Barnes	50

COAL AND COKE.

Solvay Foundry Coke	
Connelsville Foundry Coke	
Steam Lump Coal	
Best Slack	

Net ton f.o.b. Toronto

BOILER TUBES.

Size	Steel	Iron
1 in.		$
1¼ in.		
1½ in.	43 00	36 00
1¾ in.		00
2 in.	50 00	36 00
2¼ in.	53 00	38 00
2½ in.	55 00	00
3 in.	64 00	50 00
3½ in.		00
3½ in.	77 00	60 00
4 in.	90 00	

Prices per 100 ft., Montreal and Toronto.

OILS AND COMPOUNDS.

Castor oil, per lb.	40
Raw oil, per gal., bulk	16
Palmine	19
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	45½
Cylinder oil, Acme	36½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	2 50
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial queen-hing oil	50½
Petroleum fuel oil	12½

BELTING—NO. 1 OAK TANNED

Extra heavy, single and double	30 5%
Standard	10
Cut leather lacing, No. 1	1 95
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 50 ft.	3 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
M.L. Jap. Steel Tape, 50 ft.	2 50
Cross Steel Tape, 50 ft.	2 75
Cross Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

WASTE.

	White Cents per lb.
XXX Extra	20
Mixed	19
Colored	19
Cotton waste	18
Waste	18
Wiping rags	17
Flannel	16

COLORED.

Mixed	14½
Standard	13
Navy	13
Peerless	11½
Khaki	10½

WOOL PACKING.

Arrow	25
Axle	20
Anvil	15
Anchor	11

WASHED WIPERS.

Select White	12
Mixed colored	10
Dark colored	09

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard	40%
Best grades	20%

ANODES.

Nickel	50 to 54
Cobalt	1 75 to 2 00
Copper	44 to 46
Brass	49 to 56
Zinc	23 to 25

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	35 00	35 00
Copper wire, list plus 10.		
Plain sheets, 14 oz. 14x48 to 14x60 in.	55 00	53 50
Copper sheet, tinned, 14x60 14 oz.	60 00	54 25
Copper sheet, planished 14x60	64 00	60 00
Bright tin sheets, 1x14 base	55 00	52 00

BRASS.

Brass rods, base ½ in. to 1 in.	0 35
Brass sheets, 8 in. wide, 20 oz.	0 50
Brass tubing, seamless	0 57
Copper tubing, seamless	0 58

PLATING SUPPLIES.

Polishing wheels, felt,	3 00
Polishing wheels, bull-neck	1 75
Emery in kegs, American	06
Pumice, ground	05
Emery grain	15 to 20
Tripoli composition	04 to 06
Crocus composition	07 to 08
Emery composition	08 to 10
Rouge, silver	35 to 40
Rouge, powder	30 to 35

Prices Per Lb.

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$18 00	$18 00
Sheets, 3½ lbs. sq. ft.	18 00	18 00
Sheets, 4 to 6 lbs. sq. ft.	17 50	17 50

Cut sheets, ½c per lb. extra.

Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ 15
Acid, hydrochloric	05
Acid, hydrofluoric	14½
Acid, nitric	.10
Acid, sulphuric	06
Ammonia, aqua	08
Ammonia, carbonate	15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	12
Copper, carbonate, anhy	35
Copper, sulphate	17
Cobalt sulphate	70
Iron, perchloride	20
Lead acetate	16
Nickel ammonium sulphate	12
Nickel carbonate	35
Nickel sulphate	15
Potassium carbonate	75
Potassium sulphide (substance)	26
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	05
Sodium cyanide 127-130%	45
Sodium hydrate	.04
Sodium hyposulphite, per 100 lbs.	5 00
Sodium phosphate	.14
Tin chloride	60
Zinc chloride	60
Zinc sulphate	09

Prices Per Lb. Unless Otherwise Stated

The General Market Condition and Tendency

WHILE the outlook in the iron and steel industry continues unsettled there is a more general realization that little improvement may be looked for in the near future even if some relief is obtained through a modification of the terms of the embargo. The shortage of steel, which will undoubtedly become more acute as demands for war purposes become heavier, will be a serious matter for the consumer engaged in the manufacture of products not required for the prosecution of the war. The restriction in output will be felt by the public generally and will doubtless result in a shortage of many articles used for every-day purposes. On account of the unsettled conditions prevailing in the steel market, consumers are only buying from hand to mouth to fill more urgent requirements. Steel prices are holding firm with the exception of light gauge black sheets which have declined. There is no indication at present of any general recession in prices, same appearing improbable for some time. Pig-iron prices are firm and the situation in the market is unchanged. Here again lower prices do not appear likely in the meantime. The coal situation is easier, although prices are still high. It is reported that ten per cent. more coal will be allowed to enter Canada over and above the amount imported last year. Scrap metal prices are firmer. Copper, heavy melting steel and rails have advanced, but lead and spelter have declined. New discounts have been issued on hand, machine and pipe taps. Prices of supplies are holding firm, but deliveries are getting slower. The non-ferrous metal markets are quiet and prices unchanged with the exception of lead which has declined.

MONTREAL, OCT. 22, 191.—Industrial uneasiness is still apparent and manufacturers are becoming more anxious over developments across the line, many of which were primarily intended to relieve a situation that promised to become quite serious. In relation to industries directly connected with the prosecution of the war, a certain degree of relief has undoubtedly been shown, but the domestic situation is, if anything more acute than before, as it is almost impossible to place contracts for material at the prices fixed by the American Government. Under the circumstances, industrial activity is greatly hampered. As an offset to the foregoing it is understood that orders will be placed here for a considerable quantity of marine equipment, such as boilers, engines and deck machinery, for vessels now under construction in the States, and for which the material would be available from American mills through the U.S. Government.

Steel

The magnitude of the work of price regulation undertaken by the American Government is becoming more and more evident each week and is being reflected in the apparently slow progress that has been made so far. The announcements that have been made to date are however a fair indication of what may be expected in those commodities not yet touched by the price fixing regulations. It is anticipated that in view of what has already taken place that further adjustment will only be a question of a few weeks at the latest. The efforts of the Government in their price fixing programme has been to set a price as low as possible and yet one that is entirely agreeable to the producers, so that the latter will co-operate in main-

taining maximum production, and in so doing keep the market supplied with every needful commodity.

It is still a question of great importance as to whether recent developments will immediately benefit the domestic consumer. Producers are showing an apparent reluctance to entertain business from the latter source, advancing the claim that they are filled up for many months ahead and are therefore unable (or willing) to accept orders at the present time; thus the market generally is still featured by the uncertainty that has marked it during past months. The price of $47.50 for billets is somewhat lower than was expected and in addition to this the market is surprised by the range that is effective on the large and small sizes. The fixing of wire rods at $57.00, a decline on the open market price of $33.00, is undoubtedly the preliminary to the adjustment of prices now prevailing in wire products. With the exception of the war demands, the market in wire products is very quiet, consumers evidently awaiting the announcement of the Government in connection with these lines.

The plate situation is much the same. Only war requirements are receiving consideration from the mills. For this reason the domestic consumer is still as much in the dark as ever, and this condition is likely to prevail until the market becomes more settled and price-fixing has been completed. The Pittsburgh price on grooved and sheared steel skelp has been agreed upon and has been fixed at 2.90c for the former and 3.25c for the latter. In anticipation of a lower price on sheets, based on the action of the Government in relation to sheet bars, the open market has declined and prices are easier. The base price of black has declined one cent per lb., and blue and galvanized are lower by ½ cent per lb. Domestic consumers are holding back awaiting the announcement of price readjustment. The entire steel market is dominated by war conditions, producers being in no way anxious to accept orders from the trade generally. The local situation is unchanged and dealers here do not anticipate any immediate effect as a result of the price changes now in force in the States. The near future may see a slightly easier tone but the impossibility of obtaining material except under special license may have a contrary effect and such material as is now on hand may bring still higher prices than now quoted.

Metals

With the exception of tin, which retains its firm position, the general tone of the metal market is one of nervousness, largely as a result of the unsettled condition that has continued to feature the situation in the States. The fixing of prices, while seemingly eliminating the fluctuating feature of the market, has not had the effect of relieving the situation as far as the securing of material is concerned, and it is if anything more difficult for domestic consumers to obtain materials now than it was a few months ago. This however, may not be of a permanent character, and with the further fixing of metal and steel prices it is hoped that the general situation will become easier. The copper situation is quite acute and the supply falling below the demand. Tin is strong and fairly active. Spelter is dull and inactive. Lead is weak and unsteady, while antimony and aluminum are easier on poor demand.

Copper.—The price fixing of copper has had no material effect upon the market other than to ensure that the U.S. Government requirements will be filled at the prices arranged. One of the factors that tends to make the situation somewhat acute is the falling off in production, making it increasingly difficult for the domestic consumer to supply his needs. Delivery on old contracts is being made, but there is an apparent reluctance on the part of the smelters to accept or entertain new business on the present basis of prices. Should the present shortage have a similar result as that developed in other metals, there seems to be the possibility that the excess output expected at the beginning of the new year will not be able to find a market. The local situation is affected by conditions in the U.S., as the virtual embargo there operative makes it very difficult to obtain material, even under license. The market is not active and quotations are unchanged at 31 and 30 cents per lb.

Tin.—This appears to be the only metal that is maintaining any degree of stability owing to the fact that it does not come directly under the American Government regulations and the market is therefore fairly active on a steady demand with prices firm. A problem that has been receiving considerable attention of late is that of securing sufficient tin on this side to meet all requirements, and it is believed that the efforts of the American Tin Committee will shortly bear fruit in the relief that may be forthcoming in relation to the granting of permits by the British Government. While the latter will undoubtedly benefit most those consumers that are exclusively occupied on war necessities, there is the possibility that the small dealer and general consumer may share in such agreements as may be made. The New York market is nominal but ½ cent stronger at 61½ cent per lb. Local dealers report a steady and firm market at 63 cents per lb.

Spelter.—The situation in spelter is one of listless uncertainty, inactive in the extreme and awaiting the action of the Government regarding the price regulations. This latter feature is not of a very disturbing character owing to the fact that the open market quotation is little more than the actual cost of production, and for this reason it is anticipated that any price fixed by the Government will not very greatly from that now quoted. New York has again declined ⅛ cent on total absence of demand. The market here is quiet. Prices are firm, although developing an easier undertone; dealers here quote 10½ cents per lb.

Lead.—The position of lead is assuming a place similar to that prevailing in spelter, as the gradual decline in quotations during the past few weeks has brought the open market price to a figure closely approaching the cost of production. This will undoubtedly have the effect of curtailing the output, as many producers will not be inclined to operate at capacity on such small profits. With the market very inactive, the surplus stocks have gradually been increasing, and recent declines may have been made with the object of cutting down production. The New York market is now on the basis of 6½ cents per lb., this quotation representing a decline on the week of 1½ cent per lb. The local situation is quiet with dealers asking 10 cents per lb., this price being one cent lower than last week.

Antimony.—The market is very quiet and the demand is light. New York prices are lower, the quotations being 14⅝ cents; dealers here report a steady market but not heavy. Prices remain unchanged at 18 cents per lb.

Aluminum.—The situation is weaker at this writing on poor demand. New York quotations are lower but dealers here continue to quote 63 to 65 cents per lb.

Machine Tools and Supplies

Conditions in this industry show no signs of returning to the activity of say one or two years ago, the situation being practically the same as it has been for the past few weeks. With the exception of the manufacture of the six-inch shell the munitions activity is confined to the closing up of such orders as were placed several months ago. Very few of the latter are expected to be renewed. As a consequence, orders for machine tools are on a limited scale. Considerable interest is still centered in the attitude of American firms in their efforts to obtain equipment now becoming idle in many Canadian shops. The possibility of considerable ship equipment business being placed in Canada, is being actively discussed in machine circles. It is believed that United States firms are looking around with a view to placing business for marine boilers and engines with Canadian plants in a position to handle this class of work. The demand for supplies continues to be of an encouraging nature, and prices for same are well maintained.

Scrap

Dealers are still awaiting U.S. Government action in connection with the regulation of scrap prices. Uncertainty has had, and still is having, an unsettling effect on the market, and any business passing is largely of a hand to mouth nature, being only sufficient for immediate needs. The New York market is easier on all grades of scrap and old materials, while the situation here is very unsettled as both dealers and consumers are not anxious to overstock under existing conditions. The local market is lower on old

brass, leads and heavy melting steel, a decline of one cent placing the current quotation on these particular metals at 11 cents for light, and 15 cents for medium brass; heavy melting steel $20 per ton. Lead on a decline of ½ cent is quoted at 7 cents for heavy and 6 cents for tea lead.

TORONTO, ONT., Oct. 23. — Trade generally continues good, in spite of shortage of raw materials. Manufacturers, however, are handicapped because of this, and output is consequently being restricted. That conditions will become worse in this respect is practically certain, particularly for consumers using imported iron or steel products. The enormous demand for steel for war purposes is bound to affect the situation, although war orders will offset to some extent the reduced activities of firms engaged in purely domestic business.

Steel

That a serious situation for private consumers of steel products is inevitable is indicated by recent developments in the States. There is every indication of a serious shortage of steel, due to the steady increase in tonnage required for war purposes. Not only will prices be regulated by the Government, but the entire output of the mills will be supervised by the Priority Board, who will see that the U. S. Government and Allies have all the steel that is required for war purposes, and then allot what is left for commercial purposes. In view of the large tonnage required for war purposes, it will be a difficult matter to meet the demands of the ordinary consumer to the full extent of his requirements. This being the case, it is unlikely that the embargo will be modified to a greater extent than has already been done, although some leniency may be shown in the interpretation of the clause for war purposes or contributory thereto. In any event, consumers not working on war contracts are bound to suffer and manufacturing operations will be restricted. This is the most serious feature of the whole situation for those concerns using material such as can only be obtained from the States. Manufacturers who use domestic material will not be inconvenienced, except perhaps by some delay in deliveries, which can be overcome by judicious purchasing.

It is understood that the fixed prices do not apply on export business. This may be so for the time being, as the mills are not booking orders at the new prices, because they have no steel to deliver except on high-priced contracts. All new contracts will, of course, be subject to investigation by the Priority Board. The embargo also tends to neutralize the effect of the agreed upon prices, and at the present time there is no indication of a general recession in prices. There has been a decline in black sheets, although in the lighter gauges only; No. 10 and heavier have not been affected. Prices of all other steel products continue firm and unchanged.

In the United States, Government buying is the principal feature; private consumers are still holding back on account of the unsettled conditions in the market. The additional prices on steel have helped to clear the situation, but prices on a large number of steel products have still to be fixed, and until that is done buying will be light. For this reason it is probable that unfilled tonnage reports for this month will show a further decline over preceding months. Now that prices are fixed on the chief products, the U. S. Government is distributing orders for an enormous tonnage of steel for shell and ship construction.

Pig Iron

Prices of domestic pig iron continue firm and unchanged, with no indication of a decline in the meantime. It appears unlikely that there will be, in any case, a decline in prices until the furnaces have disposed of a considerable portion of the tonnage already booked. The embargo has also to be taken into consideration, which in itself is tending to hold prices up. It is hardly to be expected that U. S. pig iron will be freely licensed to Canadian consumers, as so much iron will be required in the States. Furthermore, the agreed upon prices do not apply to this market, which would preclude furnaces in the States selling iron in Canada on the fixed price basis. There has been no appreciable improvement in the coke situation, the agreed upon prices not having as yet resulted in a lowering of the market. Shortage of cars and labor has reduced the output of coke and volume of supply from the ovens.

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion $100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

Scrap

The market is a little firmer, and there has been a slight advance in prices of some old materials. All copper scraps have advanced 1c a pound and machinery composition is up 2c a pound. There is a great scarcity of heavy melting steel, and in consequence prices have advanced $3, making the new price $20 per ton, while steel rails are also higher at $20 per ton. Leads are weaker, heavy lead being now quoted at 7c and tea lead at 5¼c per pound. Scrap zinc has also declined, and is now quoted at 6c per pound. The market is quiet and business is dull, due to the unsettled conditions prevailing. Dealers are not anxious to sell, as they are looking for higher prices, while consumers are keeping out of the market in anticipation of lower prices.

Machine Tools

There have been no further developments in regard to the sale of munition plants in Canada. The outlook in regard to munitions continues obscure. Although some contracts for shells will doubtless be distributed from time to time, it appears unlikely that the industry will ever assume its former activity. A number of plants will, therefore, be lying idle, so it is a good opportunity to dispose of them.

Supplies

Prices of machine shop supplies are holding firm, with an upward tendency on some lines. The movement is not, however, so pronounced as formerly. The main difficulty now is deliveries, which are slow, particularly on imported lines. The following new discounts have recently been issued: Hand taps, ¼ to 1 in., 35 per cent.; 1⅛ to 2 in., 10 per cent.; 2⅛ to 2½-inch., plus 25 per cent.; machine taps, No. 12 and smaller, 50 per cent.; No. 13 and larger, 35 per cent. off list; pipe taps up to 1 inch, 60 per cent.; 1¼ to 2 inch, 55 and 5 per cent.; 2½ to 3 inch, 35 per cent. off list. Screw plates, dies, colletts and stocks are now list plus 10 per cent. Albany grease has advanced and is now 35c per pound. Lead wool has declined 1c, and is now quoted at 15c per pound.

Metals

The metal markets are dull, with little business of importance being transacted. The local situation reflects conditions in the States, where the price regulation has unsettled the market. The uncertain outlook is tending to make consumers hold back, and any pronounced activity seems unlikely until conditions are more settled. Prices generally are unchanged, with the single exception of lead, which has declined in sympathy with the market in New York.

Copper.—Although a price of 23½c has been fixed on copper to the United States Government and the Allies, there is considerable uncertainty in the trade in regard to the distribution of red metal at the agreed upon price. A committee of leading copper producers is working on a plan to relieve the situation and a solution of the difficulty is expected shortly. Lake and electrolytic are quoted at 32c and castings at 31c a pound.

Tin.—There is no change in the tin situation, the market being fairly active and steady. Quotations are nominal and unchanged at 63c per pound.

Spelter.—The market is dull and featureless, the chief reason being the uncertain position of copper. Local quotation is unchanged at 13½c per pound.

Lead.—Another reduction in the price of lead has been made, which brings it down to 6½c New York; the Trust and independent producers all quoting the same price. The market is weak, and is entirely without support, a further decline being probable. Lead has declined 1¾c locally, and is now quoted at 9c per pound.

Antimony.—The market is dull and

stagnant, with practically no business offering. Local price, 19c per pound.

Aluminum.—The market is dull and weak, with prices unchanged at 62c per pound.

PITTSBURGH, Oct. 20.—Price fixing at Washington is proceeding somewhat more slowly than was expected, as no additional prices have been announced since those of Oct. 11, referred to in last report. Those prices were upon large and small billets, sheet bars, slabs, wire rods, skelp and shell rounds, the prices previously fixed, Sept. 24, having been on coke, pig iron, bars, shapes and plates.

What the trade has been expecting lately has been prices on sheets, tubular goods and wire products, possibly also upon scrap, together with a precise statement as to pig iron, covering the different grades and districts. The original agreement upon pig iron was as to foundry and basic at valley furnaces. Meanwhile there have been sales of foundry pig iron by northern furnaces other than valley at the price of $33 at furnace as a tentative one.

There is ground for surmising that difficulties have arisen whereby the War Industries Board has been unable to reach a conclusion as to sheets, tubular goods and wire.

More Pig Iron Activity

The pig iron market, on the whole, has been somewhat more active than might have been expected, when set prices were named at less than two-thirds the prices at which a very considerable volume of business has been done for delivery in the fore part of next year. That business occurred chiefly in June, the market thereafter, up to the time of the price fixing, being very quiet, with transactions confined to small lots for early deliveries. In the past ten days the market has been distinctly more active than in that period. At least 50,000 tons of valley Bessemer and basic has changed hands, and the valley furnaces have sold small lots of foundry iron, all the sales being for early delivery. Some of the Virginia furnaces, on the other hand, have sold for extended delivery.

The blast furnaces are perfectly ready to let their iron go at the fixed prices, but as there are contracts on books at much higher prices they wish to protect that business as much as possible and to sell indiscriminately in the open market would make it more difficult to enforce the contracts. Accordingly the common attitude is to sell only to regular customers, and only iron that is urgently needed.

Steel Market Quiet

The finished steel market is very quiet. In the commodities for which prices have already been fixed the mills will not sell except to take care of customers for early deliveries, and as the customers are already quite well covered scarcely any business occurs. In the products for which prices have not already been fixed, it is quite significant that there is hardly any business being done. If buyers were fearful that they would be unable to secure deliveries at the prices to be fixed, they would now be playing safe by paying the higher prices that would now be asked, for on such purchases perference in delivery would naturally be given. This they are not doing, to any extent, therefore it is impossible to believe that steel is really very scarce. In the case of sheets, for instance, there were buyers for several months of both blue annealed and black at between 8.00c and 9.00c, while now, with prospects that the prices will not be much, if any, above 4.00c for blue annealed and 5.00c for black, there is no buying at intermediate prices, and one mill has been canvassing for business in the past few days on the basis of making sales subject to the prices when fixed. This is quite a curious commentary on the picture producers were drawing of their market and prospects for demand only a few weeks ago. In other words, the sheet bubble has burst.

MARKET LETTER DEVELOPMENT

The attention of metal working plant executives is directed to the enlargement of the scope and usefulness of our Market Letter Department. In New York and Pittsburgh, expert correspondents have been engaged, and are already furnishing each week concise reports of production activities, price movements, etc., within the territory served by each of these important centres. During the next few weeks, further additions will be made to the number of our United States correspondents, embracing other industrial centres, and enlarging thereby the scope of the meantime service being rendered.

War Steel Tonnage

The question of how much steel will be required for prosecuting the war is not being answered. The situation is no clearer and the latest developments merely suggest that it never will become clearer. The Government has asked sellers not to give out specific information as to orders placed, and the statements at Washington as to the amount of business expected to be placed are rather indefinite. One statement is that orders are to be placed, following upon the price agreement, for 6,000,000 or 7,000,000 tons of steel. This would be for delivery in 1918 but it does not throw much light on the matter, first because it is not known how the tonnage will be distributed among the various commodities, or whether the deliveries will be required uniformly throughout the year. Then there is the matter of purchases for the Government's Allies, which do not seem to be included in the figures just mentioned. Orders placed thus far by the Government are understood to total about 3,000,000 tons. A considerable part of this steel has already been delivered, and perhaps not much will run into next year.

Production of finished rolled steel last year was about 31,500,000 gross tons, while production now is probably running at the rate of 32,000,000 or 33,000,000 tons a year, with a probable capacity in excess of 35,000,000 tons. Production is limited by shortage of coke and labor, chiefly the former. It would seem fair to make a rough guess that the proportion of the output required for all war purposes will be not less than 30 per cent. nor more than 40 per cent. of the total output. This would include exports to the Allies. As there have been large exports to the Allies hitherto, say between 15 and 20 per cent. of the output, including steel worked up here into shells, rolling stock, machinery, etc., for export, as well as exports to neutrals of between 5 and 10 per cent., and the exports to neutrals may be extremely light, it does not seem altogether probable that steel for commercial purposes will be extremely scarce in future.

Certainly there will eventually be a large decrease in the consumption of steel by the railroads unless something is done. The railroads have been buying practically nothing of late and it is quite uncertain whether they will take hold with prices as now fixed. While there is a large reduction, prices are still fully double the average of the ten years ending 1913, and the railroads may not be able to pay. The Interstate Commerce Commission was expected to do something by way of reopening the subject of advanced freight rates, Oct. 28, but it has just been announced that the subject is postponed for 60 days beyond that date.

A foundry coke differential has not been established and the coke situation remains that $6.00 per net ton at ovens was set Sept. 21 as a general basis price. In some instances coke operators have sold regular customers foundry coke at $6.00, while it is understood a few have set their own differential by selling in a few cases at $7.00. In general there is very little foundry coke to be had and the situation is very distressing to many iron foundries.

NEW YORK, Oct. 22.—United States Government purchases of steel and machinery, for the manufacture of railroad equipment, ships, aircraft and other war munitions, on behalf of its Allies and on its own account, are heavy. Upward of one million tons of steel and $10,000,000 to $20,000,000 worth of machinery are now being distributed among American mills and manufacturers. Of the million tons of steel under consideration about 650,000 tons of steel bars, plates and shapes are required for building cars and

locomotives to be put into service in Russia and in France. Contracts for 30,000 cars and for 6,000 locomotives have been distributed among manufacturers for Russian account, alone. It is understood now that 1,500 locomotives are to be built here for Russian railroads. Additional purchases of 9,000 cars have also been made for the United States Government road in France.

Domestic railroads are also more actively negotiating for rolling stock and for motive power. The inquiries now in the market will call for 100,000 to 150,000 tons of rolled, forged, and cast steel, for American railroad equipment. Shipbuilders, holding Government contracts for destroyers and for merchant boats that will be supplied with plates and shapes on Government account at 3¼c and 3c per pound respectively, have taken up with fabricating shops the problems of supplying 125,000 tons of steel-fabricated material in the next six to eight months. Some of the contracts have already been closed and others will be placed in the next few days.

The Bethlehem Shipbuilding Co. has been organized to bring together under one direct management the various shipbuilding interests controlled by the Bethlehem Corporation. The Fore River Shipbuilding Corporation, the most important subsidiary of this merger, it is now known, has contracts to build 50 destroyers for the U.S. Government that are to be completed in sixteen months. This concern has awarded a contract to the Aberthaw Construction Co. to build a boiler shop at Providence, Rhode Island, a machine shop for building turbines at Buffalo, N.Y., and a plate and angle shop at Squantun, Mass. To facilitate the equipping of these shops in the shortest possible time, the United States Government has granted to the Fore River Company Class A priority certificates for all the machinery needed which will cost about $3,000,000. Most of the contracts for the Squantun plant have been closed, the tools being obtained practically through commandeering.

An effort is now being made at Washington to prepare a comprehensive schedule of all the machinery needed in the next year by the war and navy departments. With these facts in hand the Government will issue priority orders to manufacturers engaged on important war contracts. The Government has already secured a record of the orders taken by the leading manufacturers of machinery by which it will be able to facilitate the placing of orders for machine tools for delivery in the shortest time possible. The navy department is buying a number of tools to equip machine shops on battleships now under construction. The department has also ordered $400,000 worth of pumps from the Worthington Pump & Machinery Corporation and has placed a contract for mines with the American Gas Accumulator Co. These concerns have purchased tools in the last few few days to execute these contracts and the Kemper Construction Co. of Philadelphia, which is manufacturing various parts for cargo ships, has purchased 25 second-hand tools in the open market. A ready sale is found for nearly all of the used machinery that is available. It is an interesting fact that at a recent auction sale of second-hand tools at Chicago, prices, higher than the original cost of the machinery, were realized.

Foreign orders are being placed for tools for delivery in six to twelve months. These export orders are relatively small, but many more would be placed if the machinery were available. English manufacturers have placed orders for 25 screw machines with a Cleveland concern, while other tools for export to France and Japan are under negotiation.

HIGH STEAM PRESSURE AND FUEL ECONOMY

AN interesting experiment relating to the fuel economy to be realized by the use of steam at high pressures and temperatures has been carried out by the British Thomson-Houston Company, who at the end of 1914 installed in their Rugby works a 1,500 kw. turbo-alternator supplied with steam at a pressure of 350 lb., and superheated to a total temperature of 700 deg. F. It was originally hoped to use a pressure of 500 lb., but ultimately a compromise at 350 lb. was adopted after consultation with Messrs. Babcock and Wilcox, who furnished a boiler of their self-contained marine type with a capacity of 18,000 lb. of steam an hour, and fitted with chain-grab stoker and induced draught. The turbine, of the impulse type, was built to standard design, modified to suit the new conditions. The generator is totally enclosed, and the air used for cooling is delivered to the boiler grate.

Tests showed the steam consumption per kw. hour to be about 12.8 lb. at half-load, 12 lb. at 1,020 kw., 11.6 lb. at 1,230 kw., and 11.2 lb. at full load, the vacuum being 28½ in.; these figures include generator losses and excitation, but not power for the auxiliaries. On a ten hours' test the actual coal consumption was found to be 1.83 lb. per unit generated, the calorific value of the coal fired being 10,985 B.Th.U. per lb. The boiler efficiency varied from 80 to 83 per cent., and the vacuum was 27.7 in. This consumption refers to the turbo-alternator only, and does not include the power taken for auxiliaries, which could not be properly estimated as the circulating pump also supplied other condensers.

The plant proved so successful and economical that it was put in commercial operation on the power circuit for the works, and the saving in coal exceeded the 15 to 18 per cent. predicted in 1913 by Mr. F. Samuelson, the turbine engineer to the company, owing to the improved efficiency of the plant under the constantly varying load and power conditions in a large works, though the older power plant was of comparatively modern construction. Some of the parts were found unsuitable for the high temperature and had to be renewed, but only troubles of a minor character have been encountered in either turbine or boiler, and have not interfered with the working of the plant, which is now regarded as having passed out of the experimental stage.

Recent investigation of a large power plant with a favorable load factor indicated that with a boiler pressure of 350 lb., steam temperature of 750 deg. F., and circulating water at 55 deg., the heat consumption per kw. hour generated would be 15,000 B.Th.U., with a boiler efficiency of 80 per cent., and including all losses in the turbo-generator, but not power for auxiliaries. Allowing 6½ per cent. for the last, the gross heat consumption per unit generated would be about 16,000 B.Th.U.—Times Engineering Supplement.

CANADIAN HARDWOODS NEEDED IN CUBA

"COMPARATIVELY few persons in Canada realize what a valuable asset we have in our hardwood forests of Eastern Canada," says J. C. Manzer, Acting Canadian Trade Commissioner in Cuba.

"The price of mahogany and Cuban cedar is steadily advancing, and to-day mahogany is being sold by wholesale dealers at from $110 to $130 per thousand, and cedar at from $120 to $140 per thousand. Some of our hardwoods, such as curly birch and bird's eye maple, would bring as high a price in Cuba as mahogany or cedar, and when a person uses a log of bird's eye maple or curly birch for firewood he is probably using for fuel wood that is worth from $75 to $100 per thousand. In cutting timber for firewood, all hardwood logs perfectly sound, free from knots, seams, or other blemishes, that are found to have a particularly good grain, should be put to one side to be sold for manufacturing purposes, and logs substituted for fuel that are seamy, hollow, knotty, or have other defects that would render them of no special value for manufacturing purposes.

"Good sound ash, birch and maple lumber is in demand here for making funiture, and will sell at high prices.

"This lumber should be shipped to this country in the round log, as sawn hardwood lumber is liable to warp and check when coming into a hot country, which would detract greatly from its value. This lumber could be shipped in car lots to Boston or New York and thence by steamer to Havana, or should depost in 30 to 45 minutes. The deposit be shipped direct to Havana by rail via Key West."

THE ENEMY OF THE SUBMARINE

By C. T.

THE submarine has a deadly enemy—the aeroplane. For every poison there seems to be an antidote and this is a law of nature. The aeroplane can carry bombs capable of being set to ex-

plode either on contact with the water, or so many feet under the water. The submarine under the water is unable to see the aeroplane circling above, but the latter can and does see the shadow of the submarine many feet below the surface. Directly she goes down so does the aeroplane swoop and drop bombs upon bombs on the U-boat, which must either dive lower and lower, or come up and fight with anti-aircraft guns, if she possesses them. Actually the submarine has no chance against properly armed aeroplanes, especially if there are a number of them flying in squadrons. The obstacle to the successful operation of the aeroplane defence against submarines is that they are of limited carrying capacity and therefore only capable of effective work within a radius of 200 miles or so, even if of the most powerful type.

METAL INDUSTRY IN VICTORIA

A SECTIONAL committee of the Institute of Victorian Industries is studying the possibilities of the metalliferous minerals and metal industries of Victoria. Arrangements have been made by the Ministry of Mines for the publication, during the next financial year, of information in regard to clays and other non-metalliferous minerals which should be useful to manufacturers.

A WRITER in a foreign journal points out that according to Jean Jacques Perret, the well-known French author living in the eighteenth century, Damascene blades were probably hardened in olden times by a powerful blast of cold air issuing from a narrow passage between two walls specially built for the purpose. GERMANY has actually remade Great Britain and her Colonies and her Dominions, and has done a better job than ever she accomplished in her laboratories, in the imitation of another nation's chemical products, or in her machine-shops in the duplication of another nation's patented devices.—Thomas Edison in "The Observer."

IN addition to the ordinary and well-known refractories in which silica and alumina play the chief parts, the somewhat rare product zirconia has recently received much consideration. Whilst zirconium is fairly widely distributed in Nature, it is in very small quantities, and can be rightly classed as one of the rarer elements. The most important source of the element was until quite recently the mineral zircon with its gem varieties, hyacinth and jargon. The chief source of the ore at present is the naturally occuring oxide, baddeleyite, which is almost pure zirconia. This has been obtained from the pyroxenite sand of Sao Paulo, South Brazil, also in Ceylon and in Montana, U.S.A. Its melting point is probably about 2,700 deg. Cent., and at 3,000 deg. Cent. it begins to volatilize.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL—Bahia, British Consul. Rio de Janeiro, British Consul General.

CHILE — Valparaiso, British Consul General.

COLOMBIA — Bagota, British Consul General.

ECUADOR—Quito, British Consul General. Guayquil, British Consul.

EGYPT — Alexandria, British Consul General.

FRANCE—Havre, British Consul General. Marseilles, British Consul General.

INDIA—Calcutta, Director General of Commercial Intelligence.

ITALY—Genoa, British Consul General. Milan, British Consul.

MEXICO—Mexico, British Consul General.

NETHERLANDS—Amsterdam, British Consul.

PANAMA—Colon, British Consul. Panama, British Vice-Consul.

PERU—Lima, British Vice-Consul.

PORTUGAL—Lisbon, British Consul.

RUSSIA—Moscow, British Consul General. Petrograd, British Consul, Vladivostock, British Consul. Odessa, British Consul General.

SPAIN—Barcelona, British Consul General. Madrid, British Consul.

SWEDEN—Stockholm, British Consul.

SWITZERLAND—Geneva, British Consul.

URUGUAY—Monte Video, British Vice-Consul.

VENEZUELA — Caracas, British Vice-Consul.

Canadian Commercial Intelligence Service

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC—B. S. Webb, Acting Canadian Trade Commissioner, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.

AUSTRALIA—D. H. Ross, Stock Exchange Building, Melbourne. Cable address. Canadian.

BRITISH WEST INDIES—E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

CHINA—J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancoma.

CUBA—Acting Canadian Trade Commissioner, Lonja del Commerci, Apartado 1290, Havana. Cable address, Cantracom.

FRANCE—Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.

ITALY—W. Mc. Clarke, c/o H. M. Consul, Milan.

JAPAN—E. F. Crowe, Acting Canadian Trade Commissioner, P. O. Box 109, Yokohama. Cable address, Canadian.

HOLLAND—Ph. Geleerd, Acting Canadian Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

RUSSIA—C. F. Just, Canadian Government Commercial Agent, Alexandrinskaia, Plosch 9, Petrograd. L. D. Wilgress, Canadian Government Commercial Agent, Bukhgolza Ulitza No. 4, Omsk, Siberia.

NEWFOUNDLAND—W. W. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

NEW ZEALAND—W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

SOUTH AFRICA—W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

UNITED KINGDOM—Harrison Watson, Sub-division E.C., 2, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London. N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian. J. E. Ray, Central House, Birmingham. Cable address, Canadian. J. Forsyth Smith, 31 North John Street, Liverpool. Cable address, Cantracom. F. A. C. Bickerdike, 4 St. Ann's Square, Manchester. Cable address, Cantracom. J. Forsyth Smith, Acting Canadian Trade Commissioner, 87 Union Street, Glasgow, Scotland. Cable address, Contracom.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA—B. Millin, Royal Exchange Building, Sydney, N.S.W.

BRITISH WEST INDIES—Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian. R. H. Curry, Nassau, Bahamas.

NORWAY AND DENMARK—C. E. Sontum Grubbegd No 4, Christiania, Norway. Cable address, Sontums.

SPAIN—J. F. Roberts, Hotel Cuatro Naciones, Barcelona.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM—W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England. Cable address, Dominion, London.

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3-16" Back Geared
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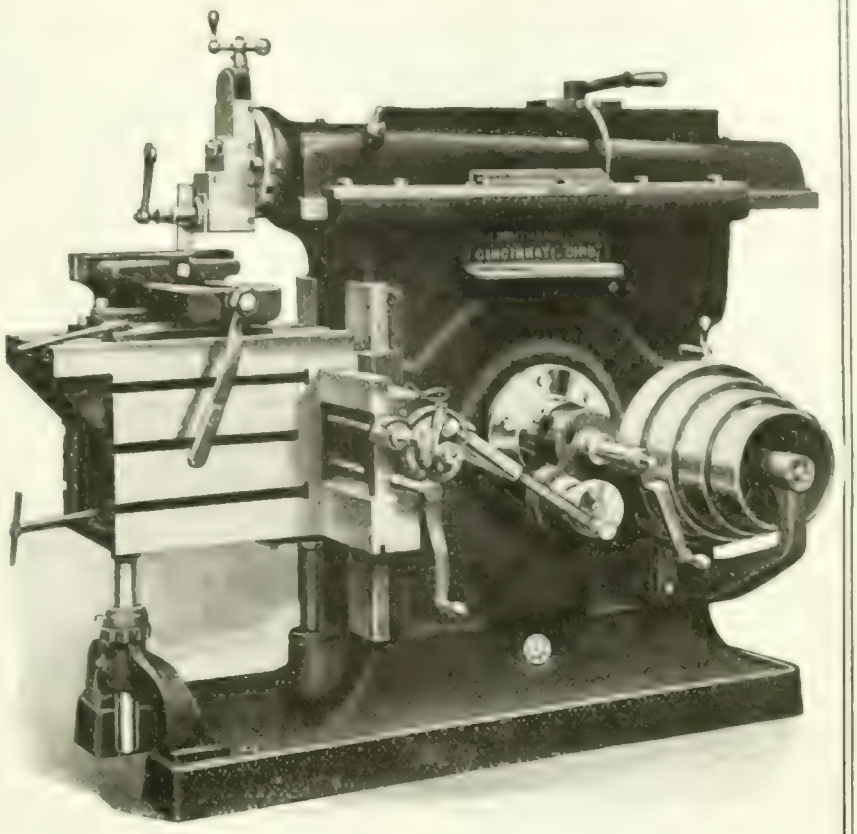

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West Front Street
TORONTO

St. John, N.B., Winnipeg, Vancouver

Does the Coolant reach those Deep Bores ?

It should---and would if you used a

TRAHERN ROTARY GEARED PUMP

on your metal working machine. With TRAHERN positive drive you can shoot coolant into deep bores or recesses difficult to cool. This is a peculiar advantage of the geared pump over the centrifugal type, as the cutting down of the stream on centrifugal pumps merely reduces its volume without increasing the intensity of the flow. This is but one of the many points of superiority our pumps enjoy over those of the centrifugal type—write for the others.

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TORONTO

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

ENGINEERING

Walkerville, Ont. — The Dominion Stamping Co. will build a forge shop to cost $16,000.

Toronto, Ont.—The Canadian Fairbanks-Morse Co. will build an addition to their factory on Bloor street.

Shawinigan Falls, Que.—The Shawinigan Water & Power Co. will build a power house at St. Narcisse, Que.

Toronto.—The Palmolive Soap Co. will build a power house at their factory on Natalie Street at a cost of $3,000.

Sydney, N.S. — A permit has been granted to the Sydney Foundry and Machine Co. to erect an addition to their foundry.

Toronto.—The Toronto Carpet Mfg. Co., have been granted a permit for an addition to a boiler house to cost $2,500.

Hamilton.—It was reported here last Wednesday that the Government contemplates erecting a large aerodrome and securing a training site in the vicinity of Winona. The expenditure is estimated at half a million dollars, General Hoar and Major McPherson have been negotiating with the property owners.

GENERAL

Brantford, Ont. — Fire damaged the Kitchen Overall Co's. factory on Oct. 15 to the extent of $15,000.

Vancouver, B.C.—The Ayres Varnish and Paint Co. will erect a new paint factory here at a cost of $2,000.

Weyburn, Sask.—The Potash Development Co. will investigate potash deposits in this district and if successful will instal a manufacturing plant.

Saskatoon.—The Maple Leaf Elevator at Southey, Sask., was destroyed by fire on Oct. 13. The origin is unknown. It is estimated that 20,000 bushels of grain were lost.

Port Hope, Ont.—Two gentlemen from Toronto visited town recently with a view to establishing a toy factory here. The two top storeys of the Cream Separator factory have been secured, and the work of placing the building in shape for manufacturing purposes begins at once.

Prince Albert, Sask.—Pat Burns, of Calgary, the Albert meat king, has purchased the Russell-Baker abattoir here, and will make Prince Albert the headquarters of his meat packing business in Saskatchewan. He will take over the plant this week.

Montreal.—The Atlas Glass plant, or later known as Premier Glass, which has been in the market for some years, has been acquired by a company which will be known as the Consumers Glass Co., composed of well-known local capitalists, who are now organizing to commence operations. The plant which was brought nearly to a state of completion about the time the business boom of 1912-13 culminated was never operated and finally fell into the hands of the bondholders. It is located at Ville St. Pierre and is regarded as an up-to-date plant and it is believed that there is plenty of room in the Canadian market for another producer, as a large quantity of glass goods is annually imported.

MUNICIPAL

St. Lambert, Que.—The ratepayers have voted in favor of borrowing $100,000 to be expended in permanent improvements.

Leamington, Ont.—A by-law will be submitted to the ratepayers to grant assistance to a company who propose establishing a sugar refinery here.

Edmonton, Alta. — The Edmonton Property Owners' Association has decided to urge the construction of a union railway station. Representations will be made to the Dominion Railway Commission.

St. Catharines, Ont.—Owing to shortage of natural gas in the district, the City Council has decided to raise the price of the supply from its municipal plant from 75 cents to $1 per thousand feet. The Council also passed a resolution requesting the Government to grant the Hydro-Electric Power Commission further power to increase its supply, owing to the fact that the supply of power from the Commission is failing.

ELECTRICAL

Tottenham, Ont.—Poles for the Hydro transmission line between Allandale and Alliston have been erected over half the distance between Cookstown and Allandale.

Toronto.—The city has received the notice being sent to all municipalities by the Hydro-Electric Power Commission of Ontario notifying them that no further contracts were to be entered into for supply of power, nor for any increase in the load of the present power users.

WOODWORKING

Arnprior, Ont.—The Arnprior Cabinet Co., in whose favor the ratepayers recently passed a bylaw, propose to construct a one-storey building about 200 x 200 of brick and concrete. The product of the factory at the start will be the cabinet work for the National Cash Register Co., victrola cabinets, high-class office furnishings and filing cabinets.

TENDERS

Toronto.—Tenders, addressed to the Secretary-Treasurer of the Board of Education, will be received until Thursdey, October 25, 1917 for electric wiring, steamfitting, plumbing, tinsmithing, ash hoists for sundry schools. Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, 155 College street.

Toronto, Ont.—Tenders will be received, addressed to the Chairman, Board of Control, City Hall, Toronto, up to Tuesday, October 30, 1917, for the supply and delivery of the following supplies:—Brass and bronze castings, cast iron pipe, hydrants, pipe, fittings and valves, lead pipe, special castings, stop valves, iron castings, manholes, gullies and grates, iron and steel, rubber valves, hose, packing, etc., etc. Specifications may be obtained at the Works Dept., Room 12, City Hall.

INCORPORATIONS

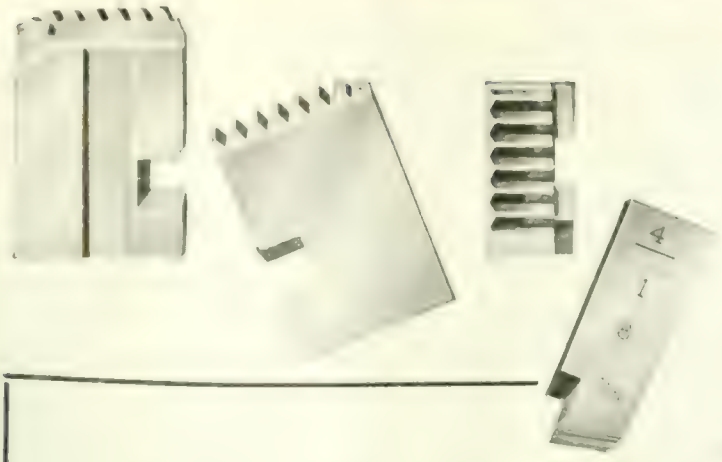
Multipost Co. of Canada, Ltd. has been incorporated at Toronto with a capital of $40,000 to manufacture machines for affixing stamps and other machines for use in mailing departments. The head office is at Toronto and the provisional directors are Donald B. Menzies and John A. Ryan of Toronto.

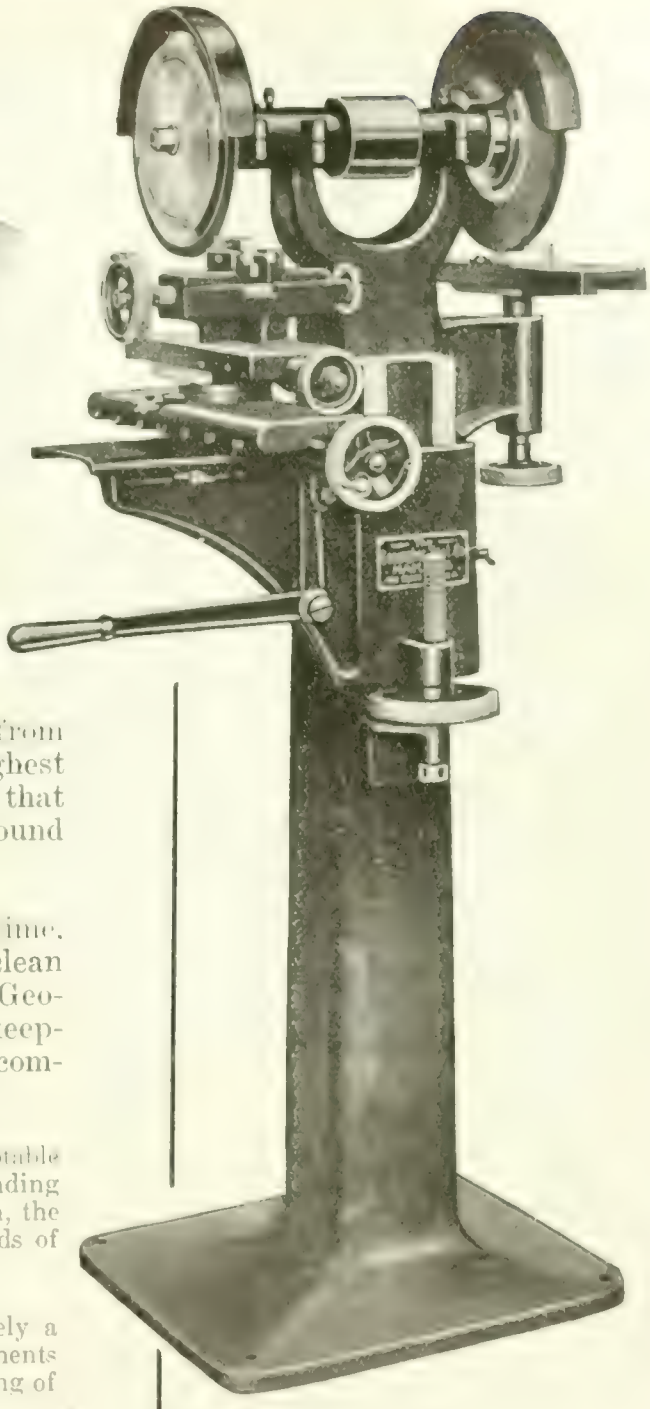
Rockwood Oil & Gas Co. has been incorporated at Toronto to sink wells and explore for natural gas and petroleum and to refine same. The head office is at Toronto and the incorporators are Leon P. Millard, William A. Brodie and John E. Gorsett, all of Toronto. The company is capitalized at $1,000,000.

Spruce Falls Pulp & Paper Co. has been incorporated at Toronto with a capital of $3,500,000 to carry on the business of manufacturing pulp wood, wood pulp and paper at Spruce Falls, Ont. The provisional directors are Thomas H. Barton, Charles M. Garvey and Thomas M. Weatherhead, all of Toronto.

BUILDING

Toronto, Ont.—City Architect Pearse, after utilizing the City of Chicago code in granting permits for flat slab concrete construction, has made extensive tests of this kind of worrk, the results of dwhich will be incorporated in new by-laws to cover future flat slab construction.





Sharp Chasers Cut Clean Threads

Accurate, uniform threads result only from dies which are maintained in the highest state of cutting efficiency. This means that chasers must be kept sharp, and ground uniformly.

Even if just touched up from time to time, the chasers respond splendidly, with clean threads. And with this machine—the Geometric Chaser Grinder—the matter of keeping threading tools up to scratch is a comparatively simple matter.

Any make of chaser can be ground on this adaptable machine. The two wheels permit the easy grinding of both milled and tapped chasers. In addition, the plain wheel lends itself readily to various kinds of tool grinding.

Uniform grinding of a set of chasers is purely a mechanical matter through the use of adjustments which can be accurately set to govern the grinding of an entire set of chasers.

The Catalog describing this machine is a mine of information on chaser grinding. Write for it.

THE GEOMETRIC TOOL COMPANY
NEW HAVEN CONNECTICUT

Canadian Agents:

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

If any advertisement interests you, tear it out now and place with letters to be answered.

PERSONAL

Percy C. Brooks, vice-president and manager of the Canadian Fairbanks-Morse Co., Toronto, has been appointed president of the E. & T. Fairbanks Co., scale manufacturers, St. Johnsbury, Vt., in succession to Frank H. Brooks, who has resigned.

W. A. Bostwick has been elected president of the International Nickel Co., to succeed Ambrose Monell, who resigned to enter the Government service. **R. C. Stanley** was elected a member of the board of directors to fill the vacancy created by Mr. Monell's resignation.

R. V. H. Keating, of Port Arthur, Ont., has left for Windsor, Ont., where he will spend some time as resident engineer on the large contract which the Great Lakes Dredging Co., of Port Arthur, has obtained at Ojibway on the Canadian Steel Corporation.

Sir Stephenson Kent, director of the Labor Supply Department of the Ministry of Munitions of Great Britain, with four other officials of the Munitions Ministry who are making a tour of inspection of the large war manufacturing plants in the United States, has arrived in Pittsburg. He will probably visit several plants in Canada.

Wm. Rodger, for the past year construction engineer with Fraser, Brace and Company, has resigned his position with that firm and has started business for himself as a lumber broker, specializing in ship and heavy timbers. He has the contract for supplying the timber for two of the ships now building for the above mentioned firm. Mr. Rodger has offices in the McGill Building, Montreal.

Harry Bayne, of Hamilton, Ont., has been appointed by the Department of Trade and Commerce as supervisor of metals and fibres. His business is to ensure to Canadian industries a sufficient supply of these raw materials at a reasonable price. Mr. Bayne has a thorough knowledge of this work, having for many years been connected with the Westinghouse Company and the National Car Co., Hamilton.

Ernest Belanger, well known civil engineer and member of the firm of Marion and Marion, died on Sunday night at his home, 14 Selkirk street, Montreal. He was 54 years of age. For eight years Mr. Belanger was a director of the Polytechnic School and a professor there. In 1911 he was named a member of a Royal Commission to visit the chief European countries to study technical education. He was a member of the Engineers' Association, and the Quebec Streams Commission.

C. W. Johnson, who was elected vice-president of the American Institute of Metals at its recent meeting at Boston, is general superintendent of the East Pittsburgh works of the Westinghouse Electric & Mfg. Co. He joined the Bullock Electric Co., Cincinnati, in 1897, successively holding the position of chief draftsman, engineer and production manager. From 1904 to 1907 he was superintendent of the combined Allis-Chalmers and Bullock plants at Montreal. In the latter year he entered the employ of the Westinghouse Electric & Mfg. Co. as chief inspector.

TRADE GOSSIP

J. L. Murray, son-in-law of M. J. O'Brien, who holds a controlling interest in the Renfrew Machinery Co. of Renfrew, Ont., has been elected president of the company.

Large Orders for Aeroplane Motors.—Orders for aeroplane motors, taken recently by one American firm, include 4,500 motors for the United States, 4,500 for Canada and 1,000 for England.

Arthur S. Leitch & Co., Toronto, have been appointed Ontario representatives for Mason Regulator and Engineering Co., (formerly H. L. Peiler & Co.), Montreal, who recently closed their own office in Toronto.

Goderich, Ont.—The National Shipbuilding Co. shipped recently a complete outfit comprising a 500 h.p. triple expansion engine, condensing plaint, boiler, etc. This is the fifth outfit that has been completed by this firm this season.

The Dominion Molybdenite Co., operating the mine at Quyon, Que., has in successful operation its own concentrating plant. The Callow cell is being used and the results obtained by the oil flotation process are said to be excellent.

The Standard Molybdenite Co. has been incorporated at Ottawa with a capital of $1,000,000, to acquire and develop certain mining claims situated in the Township of Egan, P.Q. The head office is at Montreal and the incorporators are O. A. Letts of Ottawa, also C. J. E. Charbonneau and E. Roy of Montreal.

Britain Acquires New Ships.—The Entente Allies have increased their shipping, according to the London Times, through the acquisition of the Royal Mail Steam Packet Co., the Lamport and Holt Line, and the controlling interest in the Argentine Navigation Co., which has a capital of $10,000,000 and owned more than 300 vessels. Three of the leading French lines and one Italian shipping company participated in the transaction.

First Train Crossed Quebec Bridge.—Another stage towards the completion of the Quebec bridge was reached on Oct. 17, when the first train crossed from the north to the south shore and back again. The train consisted of an engine drawing two flat cars, the latter carrying the bridge engineers, officials, employees and visitors. It is not definitely known when the first regular train will cross, but this is expected to be sometime in November. Much work still remains to be done.

Big Shell Output in France.—The following statement was recently made by M. Andre Tardieu, High Commissioner for France in the United States: "At the beginning of the war we could turn out 12,000 shells a day for '75's.' In the year past we have been able to turn out 250,000 shells a day. In 1914 we had only 300 heavy guns, organized in regiments. Now we have more than 6,000. Besides, we gave more than 800 heavy guns to our Russian, Roumanian and other allies.

Must Stop Export of Electric Power.—At a meeting of the Ontario Municipal Electric Association Executive at Toronto on Oct. 16 the following resolution was adopted: "That it is the opinion of this association that it is the duty of the Dominion Government to pass an order-in-council to prohibit the export of power, as it has become an imperative duty in consequence of the public necessities of the people of the western section of the Province of Ontario for additional electric power."

Abitibi Output Doubled.—The output of the Abitibi Paper Co. at Iroquois Falls, Ont., has been doubled as a result of the completion of the new pulp mill, according to an announcement of President F. H. Anson. He states that instead of 65 tons a day, the sulphite pulp plant is now turning out 130 tons a day, while at the same time the company's capacity of ground wood pulp has been increased to 300 tons daily. "We are selling now to the extent of our total increased output, and the prospects are that we will be able to do so for some time."

Oil Boat Launched at Collingwood.—The Collingwood Shipbuilding Co. last Thursday successfully launched without any formalities the oil tank steamer *Talaralite*, which they are building for the International Petroleum Co. of Toronto. This vessel is intended for ocean service exclusively, and is of the following dimensions: Length, 250 feet, breadth, 43 feet 9 inches, depth, 25 feet moulded. The oil pumping arrangement is of the most elaborate kind and of design to handle the cargo in the most expeditious manner. This is the fifth oil tank steamer built by the Collingwood Shipbuilding Co. for the same owners.

Will Build Concrete Ships At Dundee.—Plans are well advanced for the construction of concrete ships at Dundee, Scotland, according to information received in a despatch from H. Albert Johnson, the American Consul at that port. The despatch says that the Dundee harbor trust has been informed by the Caledon Shipbuilding Co. that it has accepted the offer of the harbor trust of a building site for the construction of the concrete ships. The site is to include approximately fourteen acres, and will be put in condition by the harbor trust immediately for the commencement of work on the building of the shipyard by the Caledon Co.

B. C. Government Aids Railway.—Provincial credit will be extended to the Pacific Great Eastern Railway to the end that the contract which the company let last November for some 21,000 tons of steel rails to the United States Steel Corporation may be held. The price at which the company let the contract last November was approximately $800,000 and the cost of the rails, plates and other accessories ordered at that time would,

when landed in British Columbia aggregate $1,250,000. At present prices it is estimated there is shown a profit of $1,000,000 on the contract entered into by the company last November.

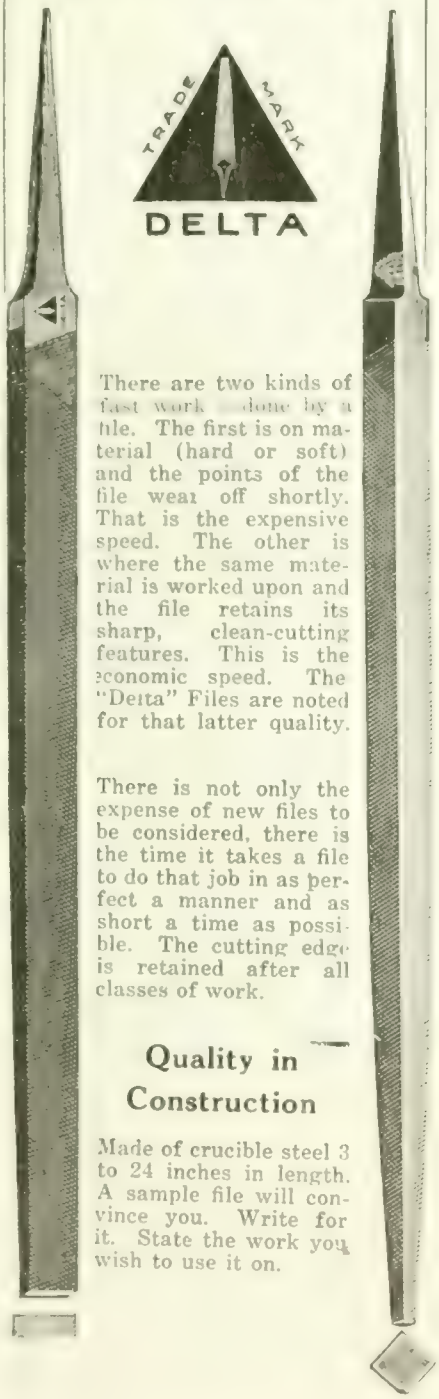
U. S. Pig Iron Output Larger.—News from American steel and iron trade centres that buying of pig iron on the new price basis is expanding rapidly is the most satisfactory development in the industry since the first prices were fixed. It speaks well for the realization of the country's full expectations of the industry—that operations in all lines necessary to the completion of the war and shipping program be maintained at the highest level. If pig iron, the basic commodity, begins to move out rapidly from the furnaces, it is axiomatic that the semi-finished and finished steel products will be turned out at a faster rate than in recent weeks.

New Coal Regulations Pending.—It is understood that new regulations limiting coal exports to Canada will be announced in a few days by the fuel administration, Washington. The control will be through special permits to shippers, who will be allowed to forward cargoes up to the amounts prescribed by the fuel administration without obtaining special export licenses. Permits will be granted only to shippers who sent coal to Canada last year. The plan is to hold Canada the rest of this year to supplies not exceeding ten per cent. more coal than was received last year. This arrangement is based on a ten per cent. increase in production in the United States this year and permits Canada to share equally with the States.

Ships for Ocean Service.—The first of the Canada Steamship Lines' boats, the H. M. Pellatt, which have been taken over jointly by the Canadian and Imperial Governments, has reached Montreal and will be put in service shortly. The work of overhauling and refitting the boat was completed in Kingston over a week ago. The vessel has been considerably strengthened for the more exacting work that is required in ocean traffic. The steamer A. E. Ames is now being fitted in Kingston and the steamer "Beaverton" is in dry dock at Buffalo and should be completed in a few days. The work is being rushed and when these boats have cleared their places will be taken by the Calgarian and the Hamiltonian.

Associate Committees for Special Research.—In order to increase the scope and efficiency of the work being done by the Advisory Council for Scientific and Industrial Research, the Council will appoint a number of associate committees to deal with various special subjects. Two special committees have already been formed, in connection with the chemical industries and with mining and metallurgy. Each of these committees consists of twenty members, with special qualifications for looking after the industries of Canada in these two important fields. It is also announced that the Council has taken over from the Arthur D. Little Co., on behalf of the Dominion Government, the natural resources sur-

Fast Work



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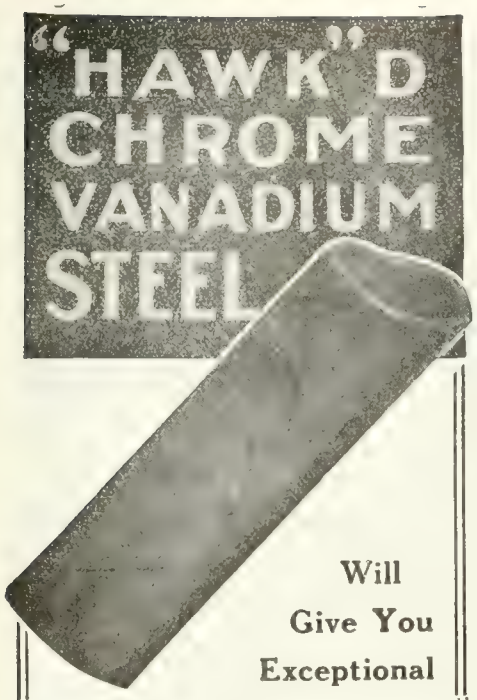

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vey of the Dominion which this company has inaugurated. The work will be continued by the Council on a much more extended scale, in co-operation with the various Government departments.

Revenue of Dominion.—The revenue of the Dominion for the first six months of the fiscal year ending Sept. 30, as shown in the September financial statement issued by the Department of Finance, was $127,477,904, as compared with $103,589,680 during the same period last year, an increase of nearly $24,000,000. Ordinary expenditure was slightly in excess of $50,000,00, a decrease of almost half a million as compared with last year. Capital expenditure, including war account, totalled $95,144,093, as compared with $116,057,905 for the six months period in 1916. The decrease is due to the fact that war expenditures in Canada from April to September last year amounted to$104,538,895, while this year's expenditure in Canada was $87,772,857. The decrease is due to the heavy movement of troops overseas. The debt of the Dominion now stands at $901,009,501, an increase of $36,865,910 for the month.

Russian Car Purchases in the U. S.—The United States War Purchasing Board has approved the request made by the Russian War Purchasing Board located at Washington for 3,000 freight cars for Russian railroads. A former request for 10,000 freight cars was approved some time ago. Of these 10,000 cars, all shipped in parts, to be assembled later in Russia, about 6,000 have been, it is said, landed in Russia, the other 4,000, still in parts, being held up at some Pacific port awaiting transportation. The Russian War Purchasing Board here set out to buy 30,000 freight cars, and for that purpose tried to buy outright several plants. They were not allowed to do this, as it would take such plants as they purchased beyond the control of the United States Government, which desired to control them for its own use if necessity arose. So the Russian War Purchasing Board here can enter into contracts for railroad equipment only when such contracts as it may make are approved by the United States War Purchasing Board.

British Steel Suggestion. — British steel makers, with an eye to market conditions in the future, are considering ways to reduce costs and get the most efficiency out of existing plants. At a recent meeting at the Iron and Steel Institute in London the following suggestion was presented by a committee, which had studied the manufacturing situation: That if the steel trade of Britain is to hold its own in open competition with other steel-producing countries of the world, it will be necessary, among other things, to have a Central Board to which all orders will go, and from whence the work will be allocated to the different works, according to their ability to do it. This would save the enormous amounts of capital locked up in rolls. Many mills have rolls for practically all the British standard sections, and change the rolls as required to suit orders. If, on the other hand, the orders were sent from a Central Board mills could be kept on work allocated to them for long periods, thus reducing the amount of roll changing and also the cost of production.

RAILWAYS & BRIDGES

Montreal, Que.—Paul Mercier, chief engineer, has reported to the Board of Control that $20,000 would have to be expended on the Lachapelle Bridge to put it in a state of repair which would make it safe for the public to use without danger.

Toronto, Ont.—An agreement between the Counties of York and Peel and the Toronto-Hamilton Highways Commission, regarding the apportionment of the cost of new bridges on the highway, will be reached shortly as a result of the hearing before the Ontario Railway and Municipal Board. Chief Engineer Hogarth, of the Highways Department, stated that a bridge of the type approved by the department would cost about $15,000. The bridges constructed by the Commission at Mimico Creek, Etobicoke and Port Credit represent an expenditure of about $25,000, so that the counties will have to pay approximately $10,000 on each bridge.

MARINE

Cornwall, Ont.—The steamer St. Laurent, owned by the Montreal and Cornwall Navigation Co., was burned to the water's edge while lying moored in the Cornwall Canal, opposite Central Park, on Friday evening. The loss is estimated at $15,000, with $5,000 insurance.

Oshawa, Ont.—The Department of Public Works, through J. M. Wilson, district engineer, has notified G. D. Conant, Mayor of Oshawa, that work will be at once proceeded with for the purpose of making the wharf at Oshawa harbor available for the landing of coal next spring.

Sarnia, Ont.—The Sarnia Bridge Co. have been awarded the contract for the erection of a large gantry crane for the Playfair interests at Midland, Ont. The tower will be 40 by 40 feet square, with cantilever arms 87 feet long, and the total length of the crane will be about 216 feet.

Kingston, Ont.—Another severe gale swept the lake on Oct. 15. The steamer Richard W., belonging to Montreal, went ashore four miles below Long Island. The Donnelly Company succeeded in releasing the steamer Thiepval, which broke away from her lines and drifted on to Barriefield shoal.

Port Dover, Ont.—A large delegation of businessmen and manufacturers in this district who came here recently to inspect the harbor, passed a resolution urging upon the Dominion Government the necessity of improving the present slip for docking facilities at Port Dover, to be ready for the opening of navigation in the spring of 1918.

The G. A. Graham Wrecked.—The steel freighter G. A. Graham, owned by the Montreal Transit Co., was driven out of her course while crossing Lake

[illegible] on Sunday and [illegible] at South Bay, close to Manitoulin Island. She is believed to be a total constructive loss. The G. A. Graham was built in 1891. She is 310 feet long, has a beam of 39 feet, and is of 2,409 gross tons.

Sarnia, Ont.—The steamers Waubic, [illegible] in their winter berths in Sarnia Bay, and according to previous announcements made by the Northern Navigation Co., the Hamonic and Huronic will also winter here upon the completion of the season. The Hamonic is now in drydock at Detroit for repairs to the propeller, a blade of which was broken off by contact with some obstruction, while the steamer was en route to Windsor for freight.

Sarnia, Ont.—The contract for floating the steamer George A. Graham, wrecked off Manitoulin Island, has been awarded to the Reid Wrecking Co. The wreckers are to deliver the boat and cargo in port for a lump sum or on percentage basis, underwriters' option. The contract is on "no cure no pay" plan, the wreckers getting nothing if they fail. The Graham is in bad shape, it is stated, having broken in two, but a large part of the grain cargo can be saved. The boat was formerly the Marina.

CATALOGUES

Centrifugal Pumps.—Bulletin No. [illegible] showing a few centrifugal pumps made by the Smart-Turner Machine Co., Hamilton, Ont.

The American Institute of Metals has issued volume 10 of transactions covering the tenth annual meeting held at Cleveland, O., in Sept. 1916.

Marine Specialties.—A new bulletin 50E has been issued by the James Morrison Brass Mfg. Co., Toronto, dealing with an interesting line of marine specialties which they manufacture.

Grinding Wheels.—American Emery Wheel Works, Providence, R. I. Reference card. Gives considerable useful information as to the speeds that are recommended for grinding wheels and the various grades and grains for handling different classes of work. The card consists of a celluloid holder and a slide upon which the various information is contained and may be read through slits in the casing.

Gear Hobber.—The Himoff Machine Co., New York, have issued a bulletin illustrating and describing their 8-inch and 24-inch Hercules gear hobbers. The principal features embodied in the design are dealt with and a specification giving the principal dimensions is also included. A separate price list is mailed along with the bulletin containing specifications and prices, for each size of machine.

Power Presses.—Toledo Machine & Tool Co., Toledo, Ohio. Catalog No. 11 and pocket reference book. The first shows an extensive line of presses and other machinery, dies, and special tools. It is divided into 17 sections, each dealing with some particular class of machine. In

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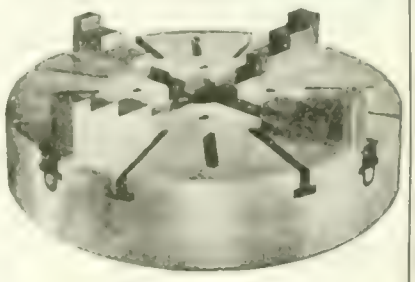

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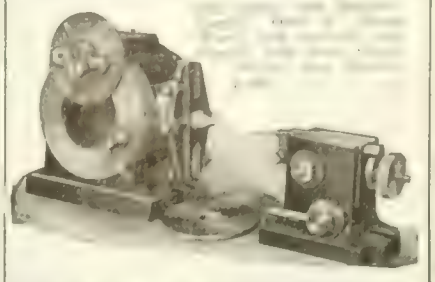

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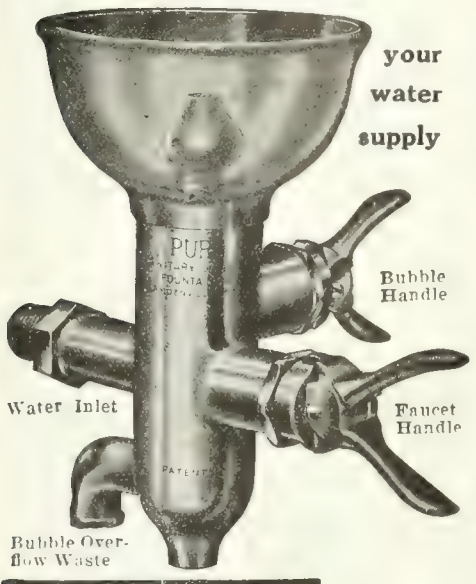

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general a brief description of the construction of the line of machines covered by each section is presented on the first page or two followed by illustrations and short descriptions of the different machines. A sectional index which will facilitate the finding of any particular machine is included, as well as a comprehensive telegraph code and tables of useful information. The reference book is intended to slip in the vest pocket and gives in much briefer form the information contained in the large catalog.

BOOK REVIEW

The Utilization of Pyrite Occurring in Illinois Bituminous Coal.—The possible recovery and utilization of pyrite occurring with bituminous coal is suggested in Circular 5 of the Engineering Experiment Station of the University of Illinois by Professor E. A. Holbrook of the department of Mining Engineering. A series of experiments conducted on a commercial scale has shown that, where pyrite occurs in sufficient quantities to justify its recovery, a 50-ton plant may be designed to serve a single mine or group of mines which will yield a profit of about $75.00 per day, or $1.50 per ton of raw pyrite, with an initial capital cost of about $18,000. It is pointed out that the market for domestic pyrite is active at present and that prices as high as $8.00 per ton are offered. The supply of Spanish pyrite which normally is adequate to meet the demand in the United States has been cut off while the extent of the uses for the mineral has increased. The circular referred to presents a discussion of the composition of pyrite, a detailed review of present market conditions, a description of the machinery required in a preparation plant, and a statement of the methods of operations to be employed. The circular is illustrated with charts and photography, and also with drawings showing suggested plant arrangements. Copies of the publication may be had by addressing the Engineering Experiment Station, Urbana, Illinois.

BIG INCREASE IN CANADIAN TRADE

FOR the first six months of the fiscal year ending with August, the total trade of the Dominion amounted to $1,347,781,936, as compared with $1.148,859,412, an increase of approximately two hundred million dollars. For the month of August alone, Canada's trade reached the large figure of $193,803,517. For August, 1916, it was $161,767,951.

For the six months' period free goods were imported to the value of $250,836,205 and dutiable goods to the value of $299,089,013. Imports totalled $549,925,223 apart from coin and bullion, as against $390,965,243. Duty collected for the six months amounted to $88,280,620, as compared with $70,102,854 for the same period last year.

Domestic goods to the value of $767,091,657 were exported during the six months. Last year for a similar period the value of domestic exports was $536,722,671.

The total value of domestic manufactured goods exported for the six months was $345,960,390, as compared with $190,823,240 in a similar period last year. Agricultural products (domestic) exported during the six months' period reached a total of $260,654,960, as compared with $206,141,326 last year. Domestic animals and animal products exported were valued at $83,002,705, as against $53,382,886 last year.

G.T.P. PROGRESS REVIEWED

THE adjourned annual meeting of the Grand Trunk Pacific Railway Co. was held at the general offices, McGill St., Montreal, on Oct. 17.

In reviewing the results for the past year, the Chairman, Alfred W. Smithers, said it was gratifying to note an improvement, although much remains to be accomplished before the property could be on a self-sustaining basis. This condition, however, could only be the natural result of constructing lines of transportation through hitherto unsettled and undeveloped country, and was the history of all other transportation lines. It was therefore encouraging to note marked improvement in these conditions from year to year as the advent of the railway had made possible the discovery and opening of almost unlimited natural resources. Notwithstanding the stopping of foreign immigration during the war, a very considerable immigration from the United States, well equipped financially for farming and other pursuits, continued to go into the new country, and in addition to the increased acreage taken up, a number of lumber mills along the Fraser River, in British Columbia, had been built to supply the increasing demand for lumber on the prairies, all of which made traffic for the railway.

Mr. Smithers presided, and the following directors and officers were elected for the ensuing year: Directors—Alfred W. Smithers, Sir H. M. Jackson, John A. Clutton-Brock, Sir Wm. Lawrence Young, Howard G. Kelley, E. J. Chamberlin, W. H. Ardley, Frank Scott, W. H. Biggar, Hon. R. Dandurand, Wm. Molson MacPherson, J. E. Dalrymple, Peter McAra and J. B. Fraser. Officers—Howard G. Kelley, President; W. P. Hinton, Vice-President and General Manager; W. H. Biggar, Vice-President and General Counsel; J. E. Dalrymple, Vice-President; Frank Scott, Vice-President and Treasurer; Henry Phillips, Secretary; W. H. Ardley, Comptroller.

U.S. Coal Prices Revised.—The first general increases in schedules of coal prices fixed by President Wilson in August are announced by the Fuel Administration at Washington. Increases are granted in the Kentucky, Tennessee and Virginia fields, where operators complained that the prices set by the President were too low to allow them to operate

at a profit. The new schedule of prices for these three States follows: for run-of-mine, $2.40, former price, $2; for prepared sizes, $2.65, former price, $2.25; for slack or screenings, $2.15, former price $1.75. Fuel Administrator Garfield, in making announcement of the new prices, says: "The conditions in the fields named are exceptional, and do not affect the prices heretofore fixed by the President in the principal bituminous fields. If upon completion of the investigation now being made of operators' costs in the fields affected it is found that these changes are not justified further modifications will be made at once."

TRADE ENQUIRIES

THE following trade enquiries have been received by the Department of Trade and Commerce, Ottawa.

1374. An English house at Buenos Aires, having connections with English railways and Government buying departments, wishes to represent Canadian manufacturers of the following lines: Iron sheets, iron and steel, wires, railway material and railway supplies.

1383. Zinc ores.—A London company who import zinc ores invites offers from Canadian producers able to export regular supplies. They would also consider proposals of other minerals.

1390. Mining material.—A Durban firm of import merchants makes demand for mining material.

1394. General agency.—A Durban manufacturers' representative seeks the representation of and requests correspondence from Canadian manufacturers prepared to export galvanized iron, etc.

1402. Iron and steel.—A firm in the Eastern Cape Province, South Africa, handling in a wholesale way lines suitable for the native trade, requests catalogues and price lists from Canadian manufacturers of iron and steel.

1405. Carbide.—A South African firm of engineers, acting as merchants and agents in some cases, requests direct communication from manufacturers of carbide for acetylene lighting and oxy-aceteylene welding and cutting work.

1406. Agencies.—A Durban firm of engineers, with branches in each centre of South Africa, is prepared to take up the representation for Canadian manufacturers of railway and signalling apparatus, mechanical machinery, electrical machinery, machinery specialties, steam and water packing, etc.

1407. Electrical supplies.—A Glasgow firm will be glad to receive catalogues and price lists of electrical supplies.

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2 NORTON GRINDERS — 10" x 36"—IN FINE condition; complete with stock of Norton wheels. Price $1,400 each, f.o.b. Hamilton. The National Machinery & Supply Co., Ltd., Hamilton, Ont.

3 JONES & LAMSON TURRET LATHES, WITH Collet chucks; 3" x 36"; geared head machines in fine condition. Price $1,000 each, f.o.b. Hamilton. The National Machinery & Supply Co., Ltd., Hamilton, Ont.

FOR SALE—1 90-FT. THOMAS SPACING table complete, including one indicator carriage, one trolley carriage, stands, adjustable roller, racks, etc. Adjustable as to length. The Manitoba Bridge & Iron Works, Winnipeg, Man. c15m

FOR SALE—1 NEW 25 H.P. HOR. TUBULAR boiler, 1 second-hand 12 H.P. hor. tubular boiler, tested to 150 lbs.; 1 second-hand 50 H.P. loc. boiler; 1 second-hand Leonard 12 x 12 high speed engine; 1 second-hand 500-lb. belt-driven Beaudry power hammer, only in use two months; in perfect condition. Canadian Engineering & Mfg. Co., 128 Bleury St., Montreal, Que. c9m

HYDRAULIC EQUIPMENT FOR SALE—THE equipment listed below is in first-class shape having only been used about three months. Blue prints and specifications and foundations drawings will be furnished. 2—14 x 12 x 5" Fairbanks-Morse duplex steam driven high pressure pumps at 80 gals. per minute capacity each against 600 lbs. pressure, steam pressure 150 lbs. 1—Weighted Accumulator good for 1000 lbs. per sq. inch, 16" diameter, plunger 11 ft. stroke with squeezing water cushion and wooden outside bumper blocks. The tank for the weighting material surrounding the cylinder is 10' 7" in diameter and 11' 0" high. 1—Return Suction Tank for above pumps and accumulator. Height, 9' 0", diameter 8' 0". Capacity, 2700 Imperial gallons. This equipment can be shipped immediately and is open for inspection at the company's plant. Prices on application. The Canadian Copper Company, Copper Cliff, Ont. c8m

SPECIAL MACHINERY

H. C. THOMAS, GENERAL MACHINE SHOP, tools, jigs and machine repairs. 301 King St. W., Toronto. Telephone Adelaide 3836. tf

MANUFACTURERS—WE CAN UNDERTAKE work to any specification—munition production equipment or otherwise. Write W. H. Sumbling Machinery Co., 7 St. Mary St., Toronto.

AGENCIES WANTED

ENGINEER AND BUSINESS MAN WITH office in Manchester, England, is prepared to work for a good firm desiring representative in England. Would attend to the interests of a firm shipping munitions. Box 337, Canadian Machinery. c19m

SITUATIONS WANTED

GENERAL SUPERINTENDENT DESIRES position with reliable firm. Possess years of practical machine shop experience as well as production methods, including shell work. Box 338, Canadian Machinery. c18m

GRADUATE MALE NURSE, AGE 32. HAVE established hospitals for three large manufacturing concerns. Familiar with social service, accident prevention and modern methods of employing. At present employed. Less than $2,400 not considered. Box 336, Canadian Machinery. c15m

MACHINE SHOP FOREMAN DESIRES change as shop foreman or master mechanic. Acquainted with scientific management; 26 years' experience. Box 328 Canadian Machinery. c11m

A PRACTICAL MACHINE SHOP SUPERINtendent of broad experience in Canada and States wants position as superintendent or general foreman. Large or small shop on ammunition or machinery; A1 references. Address Box 327, Canadian Machinery. c9m

WORKS MANAGER OR GENERAL SUPERintendent open for engagement—28 years' experience as machinist, toolmaker, inspector, superintendent of tool-making and tool-designing, experimental and development work, heat-treating and testing of steel in raw and finished state; shop superintendent, works manager. Experience has been on rifle work, electrical work, typesetting machines, lock-making and bridge-work. Correspondence solicited, and can furnish good references. Address Box 332, Canadian Machinery. c14m

We require a high-class

Specialty Salesman

for Montreal Territory, Engineering graduate preferred, good prospects offered.

Apply in writing only to

Canadian SKF Co., Ltd.
47 King St. W., Toronto

WANTED

WANTED—SMALL SECOND-HAND POWER press, in good condition. Hosmer Stamping & Die Works, Ltd., 831 Dundas St., Toronto, Ont. c13m

WANTED—SECOND-HAND POWER SQUARing shear to cut No. 10 gauge steel up to 24" wide. Must be in good working condition. Packard Electric Company, St. Catharines, Ont. c4m

SITUATIONS VACANT

WANTED — SUPERINTENDENT-FOREMAN, 6" British shells. Box 340, Canadian Machinery. c19m

SHOP SUPERINTENDENT—WANTED, MAN competent to take entire charge of machine shop solely engaged in manufacture of small tools. Must be thoroughly competent and have had some years' experience. Shop while small at present offers excellent opening for advancement. Apply, stating experience, salary, etc., to Box 339, Canadian Machinery. c17m

WANTED — FOREMAN BLACKSMITH FOR Montreal shop on general work. Six forges and 1,500-lb. steam hammer. Must be a hustler. Apply, in confidence, stating experience and wages expected, to Box 335, Canadian Machinery. c15m

WANTED — MECHANICAL DRAUGHTSMAN for engine, compressor, and general work. State experience and salary expected. Apply The Jenckes Machine Company, Limited, Sherbrooke, Que. c16m

FOR SALE

4 14 x 6 Flather Engine Lathes, C.R., Q.C.G., new.

4—14 x 5 Reed Engine Lathes, R. & F.

3—18 x 8 Davis Engine Lathes, D.B.G.

1—18 x 10 Rahn-Larmon Engine Lathe, new.

1—18 x 12 Rahn-Larmon Engine Lathe, new.

1—22" x 10' Nicholson & Waterman Engine Lathe.

1—No. 13 B. & S. Automatic Gear Cutter.

1—30" Newark Automatic Gear Cutter.

1—5 x 48 Pratt & Whitney Plain Grinder.

1—No. 2 Bath Universal Grinder.

1—12 x 60 Modern Plain Grinder, new.

2—Lees-Bradner Thread Millers.

1—30 x 30 x 8' Powell Planer, new.

Brownell Machinery Co.
Providence, R. I.

Last week in this space we advertised an 8 inch shell plant—We sold it. We now offer

A complete 4.5" shell plant

All tooled up for British 4.5" High Explosive Shells. This equipment is all in good operating condition and can be inspected by appointment.

FULL DETAILS ON REQUEST.

The A. R. Williams Machinery Co., Limited

64 FRONT STREET WEST TORONTO, ONTARIO

Complete 18-pr. Shrapnel Plant for Sale

PRINCIPAL ITEMS AS FOLLOWS:

1—Double End Painting Machine, with ¼ h.p. motor.
1—Lo-Swing Lathe for turning profiles.
1—Lathe, 14" swing, 6' bed.
1—Double End Painting Machine, with ¼ h.p. motor.
1—Nosing Press, for nosing shells.
1—Heskins Pyrometer
1—Nose Furnace
1—Tempering Furnace

Jenckes Machine Co., Ltd.

Sherbrooke, Que.

Long-distance messages---telegrams

are frequently received in answer to ads in this section. Readers realize the importance of getting in touch with advertisers at once. And again, this illustrates how closely the section is followed.

Have you any proposition that will interest our readers? Do you want equipment or help? If you do, here is the place to make your wants known. Your ad will get the attention of the men in the office and the men in the shop.

Mail your copy now for next week's issue.

Canadian Machinery

Classified Advertising Section

143 University Ave., Toronto, Ont.

PETRIE'S LIST of New and Used Machine Tools

In Stock for Immediate Delivery

TURRET LATHES AND SCREW MACHINES

ENGINE LATHES

18" x 8' C.M.C., D.B.G., comp. rest.
20" x 8' Fifield, B.G., plain rest.

DRILLS

No. 2 Sellers, universal.
26" Gardner, disk.

IRON PLANERS

40" x 40" x 12' New Haven, power feed.

MILLING MACHINES

Bertram, plain.
Brown & Sharpe, power feed, plain.
Van Norman, bench.
No. 2 Ford-Smith, plain.
No. 4 Fox, universal.

SHAPERS

24" Bertram, back geared.

MISCELLANEOUS

12" Hall Pipe Machine.
Bertram Single-end Punch and Shear.

H. W. PETRIE, LTD.

FRONT STREET WEST, TORONTO

RIVERSIDE
Machinery List
We Own Every Tool Offered

NEW MACHINE TOOLS

For Immediate Delivery

2—18 x 8 Springfield Q.C.G. Engine Lathes.
1—18 x 8 Springfield Standard Engine Lathe.
1—16 x 8 Springfield Q.C.G. Engine Lathe.
2—16 x 6 Springfield Q.C.G. Engine Lathes.
1—14 x 6 Springfield Geared Head Engine Lathe.
3—16" Springfield B.G. Shapers.
2—20" Springfield B.G. Shapers.
1—25" Springfield B.G. Shapers.
1—30 x 30 x 10' Wilson Two-head Planer.
3—14" Pierce Turret Lathes.
2—1 x 8 Pierce Hand Screw Machines.
2—No. 00 American Milling Machines.
1—No. 20 Bliss O.B.I. Press.
1—No. 19 Bliss O.B.I. Press.
1—No. 18C Bliss O.B.I. Press.
1—No. 18 Bliss O.B.I. Press.
5—20" Buffalo B.G., P.F. Drill Presses.
3—20" Canedy-Otto B.G., P.F. Drill Presses.
2—20" Champion B.G., P.F. Drill Presses.
2—20" Champion Plain Drill Presses.
3—20" Silver Plain Drill Presses.
1—20" Canada G.G. Plain Drill Presses.
2—24" Champion Plain Drill Presses.

USED MACHINERY

ENGINE LATHES.

1—28 x 20 Hamilton Standard Engine Lathe, with turret.
1—22 x 14 Pittman Standard Engine Lathe.
1—22 x 10 Reed Standard Engine Lathe.
1—18 x 6 Jones & Lamson Standard Engine
1—16 x 8 Potter Standard Engine Lathe.
2—16 x 6 Reed Stud Lathes.
1—14 x 8 Sebastian Engine Lathe.
1—14 x 6 Springfield Engine Lathe.
1—14 x 6 Prentiss Engine Lathe.
1—14 x 6 Sebastian Engine Lathe.
2—14 x 6 Van Wyk Engine Lathes.
1—13 x 8 Barnes Engine Lathes.
1—13 x 5 Barnes Engine Lathe.
1—10 x 4 Sebastian Engine Lathe.

TURRET AND SCREW MACHINES.

2—No. 6-A Potter & Johnston Automatic Lathes.
1—1¼" Gridley Automatic Screw Machine, motor driven.
2—1" Foster F.G.H. Hand Screw Machines.
1—5" Pierson F.G.H. Hand Screw Machine.
1—2" Warner & Swasey Turret Lathes with air chucks.
1—16" Warner & Swasey Turret Lathes with air chucks.
2—2" Cleveland Automatic Screw Machines, jigger feed.
1—3/8" Cleveland Automatic Screw Machines, jigger feed.

MILLING MACHINES AND GRINDERS.

1—No. 2 Hendey Plain Milling Machine.
1—No. 0 Brown & Sharpe Plain Milling Machine.
1—No. 1 Cincinnati Plain Milling Machine.
2—No. 13 Pratt & Whitney Lincoln Type Milling Machines.
5—No. 1½ Knight Milling and Drilling Machines.
3—Fox Milling Machines.
1—Garvin Hand Miller.
1—No. 2½ Bath Universal Grinder.
1—No. 12 Modern Plain Grinder.
1—No. 1 Landis Internal Grinder.
1—No. 2 W. & M. Surface Grinder.
1—No. 3 W. & M. Surface Grinder.
1—Miami Valley Universal Cutter Grinder.

DRILL PRESSES.

1—6' Mueller Plain Radial Drill, old type.
1—28" Niles, Bement Pond B.G., P.F. Drill Presses.
1—3-spindle 8" overhang Henry & Wright High speed Drill.
4—6-spindle Fox High Speed Drills.
2—4-spindle Fox High Speed Drills.
1—16-spindle Natco Drill.

SHAPERS AND PLANERS.

1—24" Lodge & Davis Geared Shaper.
1—18" Hendey Geared Shaper.
1—36 x 36 x 10' New Haven Planer, S.H.
1—27 x 27 x 8' Cincinnati Planer, S.H.
1—16 x 16 x 5' Hendey Planer, S.H.

PRESSES AND HAMMERS.

1—Waterbury Farrel O.B.I. Press, geared.
1—No. 30 Perkins Drawing Press.
3—No. 2-W Bliss Wiring Presses.
1—800-lb. B. & S. Roll Board Hammer.
1—800-lb. B. & W. Roll Board Hammer.
1—150-lb. Bradley Steap Hammer.
1—25-lb. Fairbanks Belt Hammer.

We also carry a large stock of Steam Engines, Steam Pumps and Electrical Equipment of all kinds.

We are in the market to purchase machine tools, both large and small.

RIVERSIDE MACHINERY DEPOT
17-29 St. Aubin Avenue
DETROIT, MICH.

Form the habit of using this section

When you want to buy or sell new or used equipment, use this section.

If you need machinery in a hurry, here is where you will find the names of firms equipped to supply your needs. And if you have old machinery which has outgrown its usefulness to you, tell Canadian Machinery readers about it in these pages.

That the same firms advertise here week after week is pretty good evidence that they are getting business. That you have looked over these ads. for equipment is evidence that others will do the same thing.

Get the habit of looking over this section every week. The bargains you will pick up by being first on the job will pay you for the time you spend each week.

Canadian Machinery
Classified Advertising Section
143 University Ave. - Toronto

Eastern Machinery & Equipment Co., Inc.
319 COMMERCIAL TRUST BLDG.
PHILADELPHIA, PA.

NEW TOOLS FOR IMMEDIATE DELIVERY.

2—No. 2 Hendey Universal Milling Machines.
1—2½ x 2" Wm. Sellers Tool Grinder.
30—18" x 5' Turning and Boring Lathes.
3—Double head Sullivan Grinders.
1—32" x 12' Pittsburgh Engine Lathe.

USED MACHINERY

ENGINE LATHES.

8—30' x 10' American, Gear Head, A-1.
1—20" x 10' Bullard.
3—24" x 14' American.

TURRET LATHES.

36—Potter & Johnson 6A Automatic Turret Machines.
3—3 x 36 Jones & Lamson Flat Turret.
2—2¼" x 24" Jones & Lamson Flat Turret, bar equipment. Full set Turret Tools.
9—25" Gisholt Chucking Lathes, 6½" hole in spindle, square turret.
14" x 6' Lodge & Shipley Turret, back geared.
5—24" Gisholt, 2-step cone, 6¼ H.S.

BORING MILLS.

6—66" swing Bement-Miles Tire Turning Mills, two swivel heads, 15½" under rail
1—37" Baush Boring Mill, 2 heads; good as new.
1—Cylinder Boring Mill, capacity of 24" diam. to 96" diam., 10' long.
Tool equipment included, good as new.
1—42" Bullard Boring Mill (2) heads.

MILLING MACHINES.

1—No. 3 LeBlond Plain Miller, table 13½ x 58¼.
1—24" x 8' Beaman & Smith Open Side Slab Miller, with two vertical spindles.
1—No. 1½ Universal Milling Machine.

SCREW CUTTING MACHINES.

2—2¾" Cleveland Automatic, Model A.
1—1¼" Cleveland Automatic, Model A.
1—2" Cleveland Automatic.
1—No. 55 National Acme, 4 spindle; good as new.
1—No. 54 National Acme, 4 spindle; good as new.

GRINDERS.

1—14" Full Universal Landis Machine.
1—No. 13 Brown & Sharpe Universal and Tool Grinder. Full equipment.
No. 1½ Universal Cutter and Reamer Grinder.
5—Fisher Profile Grinders for Cutters.
5—No. 6 Std. Universal Tool and Cutter Grinders.

DRILL PRESSES.

1—4' Prentice Radial Drill, tapping attachment.
1—2' 6" Easdick Radial Drill, tapping attachment.
1—5' 6" Full Universal American Radial Drill, tapping attachment.
2—D1 Colburn Heavy Duty Drills, latest pattern.
2—D3 Colburn Heavy Duty Drills, tapping attachment, latest pattern.

FOR SALE

One 22" x 50" Wheelock Engine, left-hand, arranged for direct shaft coupling, with heavy balance wheel 8¼" x 14" x 17'—7" in dia.

Merchants Rubber Factory
KITCHENER, ONTARIO
c20m

New York's Greatest Stock

Our Own Machines Rebuilt and Guaranteed

(Partial List)

Detrick and Harvey Open-Side Planer, 8-foot Capacity, 12-foot Platen, Four Heads. Fine Condition.

PIPE MACHINES

No. 9 Saunders, 8" to 4" capacity.
10" Cox, 4½" to 10" capacity.
No. 6 Saunders, 2" to 8" capacity.
8" Eaton-Cole & Burnham, 2" to 8" capacity.
6" Stoever, 1¼" to 6" capacity.
6" Curtis & Curtis, 1½" to 6" capacity.
4" Morris, 2½" to 4" capacity.
4" Armstrong, 2½" to 4" capacity.
2" Borden, ½" to 2" capacity.
2" Jarecke, ¾" to 2" capacity.
2" Saunders, ¾" to 2" capacity.

NEW SHAPERS IN STOCK

Twelve New 24" Hollingworth Improved Triple Geared Crank.

BORING MILLS SLOTTERS

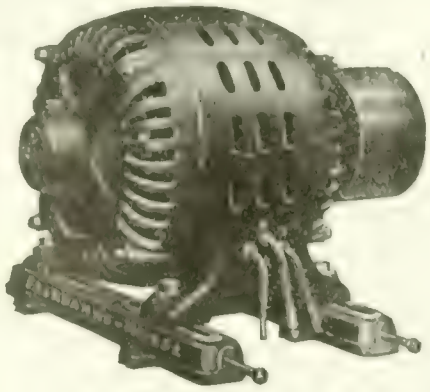
No. 2 Barrett Horizontal Cylinder Boring Machine, 5" bar.
Betts Horizontal Boring Mill, 2¼" bar.
Four 30" Bullard Vertical Boring Mills, single turret head.
20" Bullard Vertical Turret Lathe, with side head and turret head.
18" Bullard Vertical Turret Lathe, with side head and turret head.
Niles Car Wheel Boring Mill, table 48" diameter.
20" Sellers Slotter.

ENGINE LATHES

60" x 16' Fifield, face plate drive.
60" x 20' New Haven, face plate drive.
50" x 15' New Haven.
42" x 19' Putnam heavy duty.
36" x 18' Farrel.
36" x 16' Bradford.
36" x 14' Putnam heavy duty.
30" x 20' Fifield.
30" x 16' Fifield.
28" x 10' Niles.

New York Machinery Exchange, Inc.

50 Church Street . . New York City

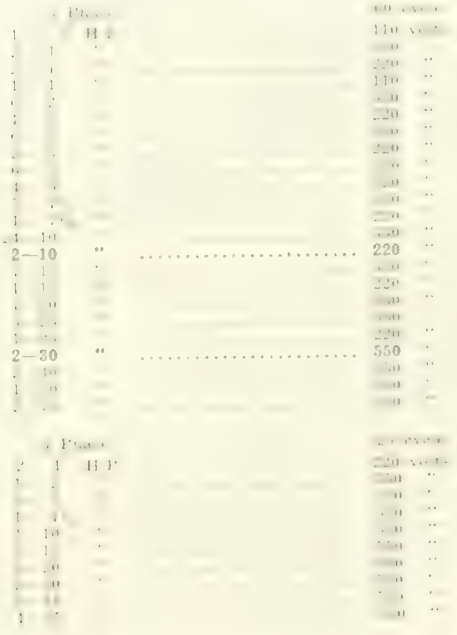


Fairbanks-Morse Induction Motors

FOR

Immediate Delivery

We have in stock at Montreal and Toronto the following motors:



The Canadian Fairbanks-Morse Co., Limited

St. John Quebec Montreal Ottawa Toronto
Hamilton Windsor Winnipeg Saskatoon
Calgary Vancouver Victoria

CFM

CANADA'S DEPARTMENTAL HOUSE FOR MECHANICAL GOODS

If any piece of equipment interests you, tear it out now and place with letters to be answered.

Slightly Used Machinery For Immediate Delivery

1—No. 27 Double Floor Grinder—Canadian Hart Wheel Make, equipped with two 12″ wheels and two spindles 33″ long. Shaft bearings 24″ long.
1—Heavy Blount Double Floor Grinder, 45″ spindle, two 8″ wheels.
1—Heavy Petrie Floor Grinder. No rest or countershaft. Shaft 36″ long, two 9″ wheels.
1—Stouffville Floor Grinder. No rest or countershaft. Shaft 32″, two 8″ wheels.
1—Large Polishing Stand (new) 4′ shaft, bearings 1¼″ x 6.
1—Brown & Boggs Lever Splitting Shear.
1—Hanson & Van Winkle Polishing Stand (no c/s)
1—Hanson & Van Winkle Polishing Stand. Shaft 5′, bearings 2¼″ x 12″.
1—No. 7 Jarecki Pipe Machine, 1¼″.
2—Heavy Grinders, Bearings 2¼″ x 12″—cross adjustment slide, one 12″ wheel.
1—8-Wheel Robinson Detroit Grinder.
1—Anvil, 154-lb.
1—Revolving Electric Plating Machine.
1—Platers Electric Dynamo, 600 Amperes.
1—Tumbling Barrel, 18″ x 4.
1—No. 23 Brown & Boggs Hand Punch and Shear.
1—Fairbanks Scale, 5-ton.
1—Hand Former, Toggle Type.
1—40 H.P. Westinghouse, 550-volt, 60-cycle, 3-phase, 850 R.P.M.
3—Westinghouse Transformers, 30KW., 2,200-550-volt.
1—2⅛″ Dreses Turret Lathe, power feed, oil pan, spring chuck No. 37220.
2—No. 6 Warner & Swasey Turret Lathes, power feed, oil pan, spring chucks.
1—No. 3 Garvin Turret, oil pan, spring chuck, 2⅛″ hole.
1—No. 22—1¾″ Garvin Monitor Lathe, oil pan, spring chuck.
1—1¼″ Davis & Egan Lathe, oil pan, spring chuck.
1—2″ Pratt & Whitney Turret Lathe, spring chuck.
1—32½ Garvin Turret Lathe, spring chuck.
1—12½ Garvin Turret Lathe, spring chuck.
1—Style "F" Single Spindle, heavy duty, Baker Drill.
1—Four Spindle Rockford Drill Press, 20″ box column, back-geared, automatic feed, automatic stop, with pump connection.
1—Garrison Press, 26,000-lb.
2—Heavy Thread Chasing Attachments.
1—No. 3 Cincinnati Universal Miller with Dividing Heads.
1—No. 2 Cincinnati Universal Miller with Dividing Heads.
1—No. 2 West Tire Setter Band Press.
1—No. 3 West Tire Setter Band Press.
1—Cincinnati Bickford 24″ Drill.
1—Cincinnati Upright 24″ Drill with tapping attachment.
2—No. 25 Foote-Burt Drills with belt guards.
2—D2. Colburn Drills with belt guards.
1—Niles-Bement-Pond 50″ Drill Press.
1—No. 400 Brown & Boggs 42″ Geared Gap Shear.
2—No. 21 Crosby Presses.
1—300-lb. Bliss Board Lift Hammer.
1—100-lb. Bliss Board Lift Hammer.
1—Barnes 24″ Geared Drill.

Write For Particulars.

Garlock-Walker Machinery Company, Limited

32 FRONT STREET WEST, TORONTO, ONT.

"EVERYTHING IN MACHINERY"

USED MACHINERY

IMMEDIATE DELIVERY

DRILLING MACHINES.

20″ Mechanics.
22″ Sibley, S.H., B.G., P.F.
30″ Lodge & Davis, S.H., B.G., P.F.
2⅛′ Gang Plain Radial.
3½′ Hamilton Plain Radial, tapping attachment.
4′ Mueller Plain Radial.
4—No. 310 Baker Heavy Duty.
3-spindle Rockford.
4-spindle Rockford.
4-spindle Washburn, with power feed.
4-spindle Allen.
No. 11 Pratt & Whitney, 10 spindles.

GEAR CUTTERS.

24″ x 7″ G. & E., spur gears.
No. 3—26″ B. & S., spur gears.
No. 4 48″ B. & S., spur gears.
No. 13—B. & S., spur gears.
30″ x 9″ G. & E., spur and bevel gears.
36″ x 9″ G. & E., spur gears.
36″ Walcott, spur gears.
24″ Gleason Gear Planer.

GRINDERS.

No. 1 B. & S. Universal.
No. 2 Woods Tool and Cutter.
Brainard Cutter.
Leland Universal, with power feed.
No. 2 Landis Universal.
No. 21 Landis Plain.
No. 1 Gardner Disc.
No. 24 Gardner Disc.
No. 6-A Diamond Universal.

LATHES.

14″ x 6′ Rockford, C.R.
15″ x 6′ Rockford Tool Co., C.R.
16″ x 8′ Bradford, C.R.
18″ x 6′ Bradford, C.R., taper attachment.
18″ x 8′ Lodge & Shipley, pat. head, C.R., taper attachment.
18″ x 10′ Fitchburg, C.R.
20″ x 11′ Blaisdell, C.R.
21″ x 12′ New Haven, C.R.
36″ x 18′ Schumacher & Boye, T.B.G., Q.C.G.
36″ x 20′ American, T.B.G.
38″ x 16′ Fifield.
42″ x 28′ Hamilton, T.B.G., raising blocks to swing 54″.

PLANERS.

24″ x 24″ x 6′ American, one head.
26″ x 26″ x 6′ Gray, one head.
26″ x 26″ x 8′ Pease, one head.
30″ x 30″ x 8′ Cincinnati, two heads.
30″ x 30″ x 8′ Woodward & Powell, one head.
36″ x 36″ x 14′ Sellers, one head.
39″ x 39″ x 12′ New Haven, one head.
48″ x 48″ x 10′ Woodward and Powell, two heads.
50″ x 50″ x 18′ New Haven, two heads, two extension heads.

SCREW MACHINES.

No. 2 P. & W., friction head.
No. 2 Foster, plain head, A.C. and W.F.
No. 3 Bardons & Oliver, plain head, A.C. and W.F.
No. 4 Pearson, friction head, A.C. and W.F.
No. 5 Foster, geared friction head, auto. chuck, power feed to turret slide and power feed to cross slide.
No. 5 Foster, all geared head, auto. chuck and wire feed, power feed to turret slide.
1¾″ Gridley, 4-spindle Automatic.
2¾″ Cleveland Automatic.
3¼″ Gridley 1-spindle Automatic.

TURRET LATHES.

No. 2 Foster-Kimball, plain head.
No. 22 Garvin, plain head.
16″ Lodge & Davis, back geared.
16″ Warner & Swasey, friction head.
2 x 24 J. & L., cone head.
24″ Gisholt, 4¼″ spindle hole, taper attachment.
No. 3A Warner & Swasey, bar attachment.

PUNCHES AND PRESSES.

No. 74½ Bliss, straight sided, geared.
Blake & Johnson Embossing.
No. 4 Long & Allstatter Single End Punch and Shear, ¾″ x ¾″, 12″ throat; new.
No. 4 Long & Allstatter Single End Punch and Shear, ¾″ x ¾″, 18″ throat; new.
No. 4 Long & Allstatter Single End Punch and Shear, ¾″ x ¾″, 24″ throat; new.

MISCELLANEOUS.

24″ Bullard Vertical Turret Lathe, turret head and one side head.
No. 00 Baker Keyseater.
No. 3 B. & S. Universal Miller, with vertical and rack cutting attachments.
6″ x 48″ P. & W. Thread Miller.
4-spindle Warner & Swasey Valve Milling Machine.
No. 3 Cincinnati Vertical Milling Machine.
No. 3 Burr Cold Saw.

STOCKER-RUMELY-WACHS COMPANY

117-121 NO. JEFFERSON STREET CHICAGO, ILLINOIS

OPPORTUNITY KNOCKS BUT ONCE!

BORING MACHINES

BORING MACHINES

BULLDOZERS

CRANES

CUTTING-OFF MACHINES

DRILLING MACHINES

DRILLING MACHINES

DRILLING MACHINES

1—No. 5 Fox, 12-spindle, capacity 1".

DRILLING MACHINES

1—NEW No. P-4 Allen, one spindle.

GEAR CUTTING MACHINES

1—No. 2 Brown & Sharpe Automatic Gear Hobbing Machine.
1—NEW 6" Standard Gear Planer.
1—6" Gleason Bevel Gear Planer.

GRINDERS

1—NEW Walker, No. 1 Outfit B

GRINDERS

GRINDERS

GRINDERS

1 No. 60 Heald, single pulley drive

GRINDERS

GRINDERS

HAMMERS

1—No. 4 Standard Machinery Co., 400 lb.
1—E. W. Bliss, 800 lb.
1—NEW Beaudry, 500-lb., belt driven.

HAMMERS

KEYSEATERS

1—No. 2 Mitts & Merrill.

1—Colburn, 4" capacity, 43" stroke.

LATHES

1—18" x 10' Hendey, quick change gear, 14" chuck.

LATHES

14—NEW 15" x 6' Rockford.

1—NEW 8-ft. Gap Bed Turret Lathe

8—NEW 28" x 12' Conradson, duplex helical drive.

1—29" x 18' 6" Schumacher & Boye.

LATHES

H-21.

MILLING MACHINES

3—NEW No. 1 Rockford, without column.

3—NEW No. 3 Rockford, on column, power feed.

MILLING MACHINES

1—NEW Bickett, No. 0
2—NEW No. 4-B Becker.

MILLING MACHINES—Planer Type

1—Ingersoll Slab, 15" x 48" cap.

with motor.

MILLING MACHINES—Lincoln Type.

PLANERS

1—30" x 30" x 8' Ohio Machine Tool Co., 2 heads.

1—36" Rotary Planer, motor driven.

ranged for motor drive.

SCREW MACHINES

NEW No. 2 Gisholt, geared friction head power feed to turret slide.

NEW No. 3 Gisholt, geared friction head power feed to turret, power cross feed.

2—NEW 2¼" Dreses, F.G.B., power feed.

SCREW MACHINES—Automatic

1—No. 2-G Brown & Sharpe.

SHAPERS

1—NEW 16" Springfield
1—16" Motor Driven Rockford
5—NEW Barker, 24".
2—NEW 24" Milwaukee.
1—25" Springfield.

SLOTTERS

1—NEW 8¼" Betts, heavy model, vertical geared

W. F. DAVIS MACHINE TOOL COMPANY

CHICAGO, ILL.
549 Washington Blvd.

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WRITE OR WIRE OUR NEAREST OFFICE FOR QUOTATIONS
THIS IS ONLY A PARTIAL LIST OF AVAILABLE MACHINES

SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

CONTRACT WORK

GEARS

CUT GEARS

HAMILTON GEAR & MACHINE CO.

Cor. Concord & Van Horne TORONTO

Poor Gears don't pay dividends. No, nor your maintenance bills either.

GEAR

GEARS AND GEAR CUTTING SPROCKETS AND CHAINS

In stock and to order, any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

Grant Gear Works, Inc., 151 Pearl St. Boston, Mass. U.S.A.

G. B. GRANT

Long Distance is Calling!

Telegrams and Long Distance Telephone Messages are not uncommon among the replies to ads in our Classified Advertising Section.

AT

YOUR SERVICE

FOR

Tools, Gauges, Jigs, Fixtures
Special Machinery

GENERAL MACHINE WORK

Experimental work

Brass and Aluminum Castings

in large or small quantities

GENERAL JOBBING AND REPAIRS

THE

MONARCH BRASS MFG.

COMPANY, LIMITED

71 Browns Ave., - Toronto, Ont

CUT GEARS

Theoretically Correct

PROMPT SERVICE

ROBERT GARDNER & SON

LIMITED

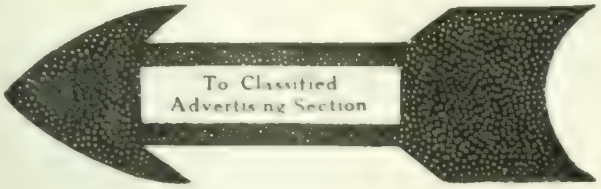
52 NAZARETH ST., MONTREAL, P. Q.

RAWHIDE OR METAL

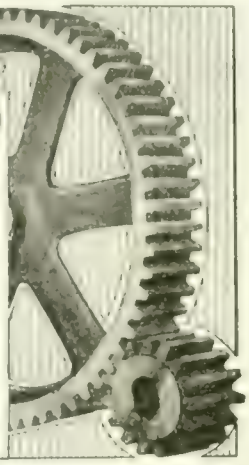
SPECIAL MACHINERY

Special Machinery, Gears, Jigs, Fixtures, Punches and Dies,
Small Tools, Screw Machine Products, Gauges, Etc.

CONTRACT WORK



CUT GEARS



Rawhide — Steel — Brass — Cast Iron

Try our W-G Rawhide Silent Gear. Designers and Builders of Special Machinery.

Winnipeg Gear & Engineering Co.
197-199 Princess St., Winnipeg, Man.

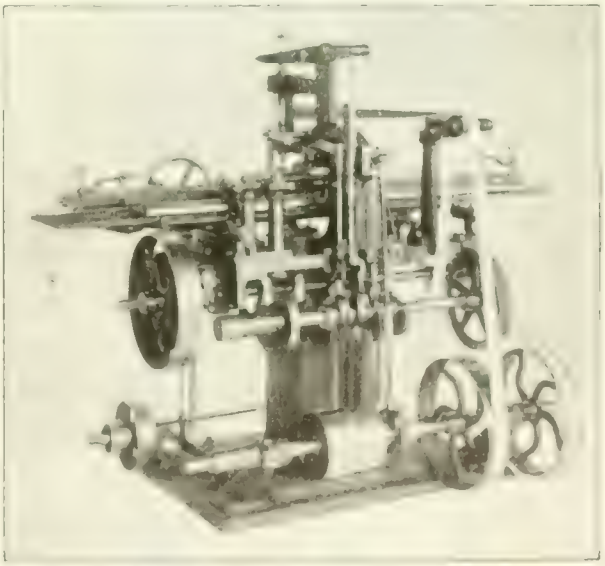
Brass, Phosphor Bronze, Copper and Aluminum CASTINGS

We have the largest Jobbing Brass Foundry in Canada.
Can make prompt delivery.

Tallman's reputation is in the goods.

Tallman Brass & Metal Co.
HAMILTON, ONT.
CANADA

We will show here from time to time some machines we build that you may judge our capabilities in this line.

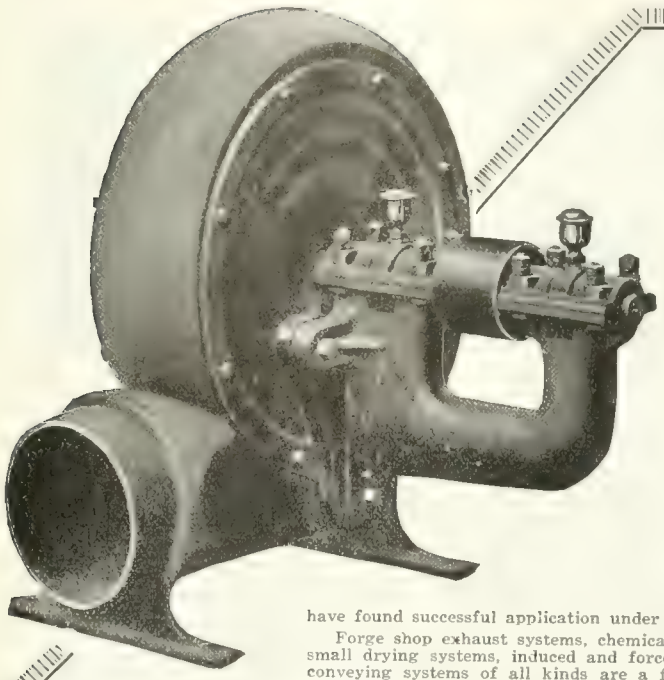


Ball Bearing Roller Race Grinding Machine

Manufactured Solely By

TORONTO TOOL CO.,
TORONTO, ONT.

516 Richmond St., West Phone Adel. 1181



Keep Your Shop Clean

The installation of an exhaust system to remove refuse from emery wheels, buffing wheels or machines used in any abrasive process—in fact for the removal of all dust, fumes or gases requires an exhauster that will stand up under the most varied and trying conditions.

"CANADIAN"

"B"

Volume Exhausters

have found successful application under every conceivable condition.

Forge shop exhaust systems, chemical plants for the removal of fumes, small drying systems, induced and forced draft for boilers and pneumatic conveying systems of all kinds are a few direct applications.

Shavings and other stringy material can be removed economically and satisfactorily with a "B" Volume Exhauster equipped with a special non-clogging blast wheel.

Write Dept. 16 for more information.

Canadian Blower & Forge Co., Ltd.

Kitchener, Ont.

Let the Boss Know It!

IF you are a reader of Canadian Machinery, go tell your employer about it some convenient time! You couldn't tell the up-to-date manufacturer anything that would please him more. He would know that you are abreast of the times; that you are ambitious and interested in your work; that you are acquainted with methods and machinery which make for greater efficiency. He will say softly to himself: "Here is a live wire,—I'll just keep my eye on that chap."

If you are not a regular reader it will pay you to become one right away—quick.

Subscription price—$3.00 per year. 52 issues.

The Only Grand Prize for TOOL HOLDERS

Awarded separately and independent of other lines exhibited at the

PANAMA-PACIFIC EXPOSITION

WAS WON BY

ARMSTRONG TOOL HOLDERS

HIGHEST AWARD

at 4 World's Expositons

Paris - - - 1900
St. Louis - 1905
Liege - - - 1904
San Francisco 1915

THEY ALWAYS MAKE GOOD

They Are Saving Millions of Dollars in High Speed Steel

CATALOG FREE

Armstrong Bros. Tool Co.

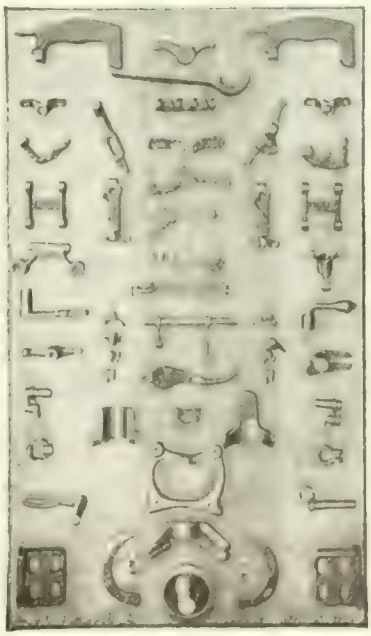
"The Tool Holder People"

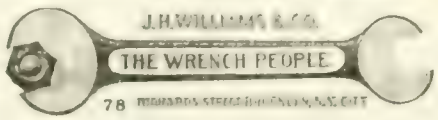
306 N. Francisco Ave., CHICAGO, U.S.A.

The Panama-Pacific MEDAL OF HONOR was also won by ARMSTRONG Drop Forged Wrenches, Ratchets, Clamps, Lathe Dogs, Etc.

Witness a Drop-Forge Shop in action

And you acquire a new idea of endurance





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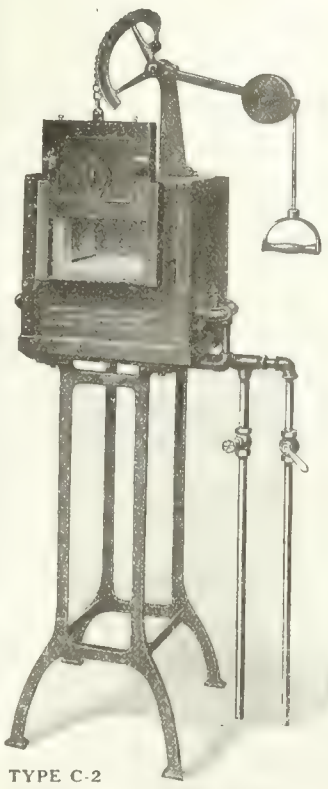


TYPE C-2

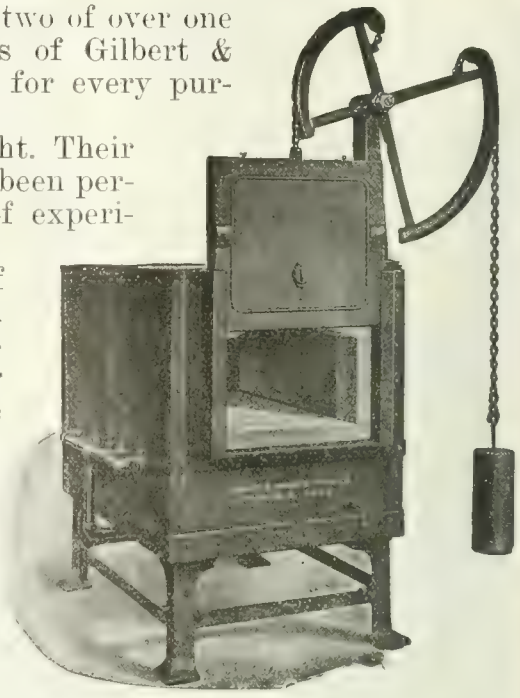
The Right Furnace For
Every Purpose

THE types shown are only two of over one hundred types and sizes of Gilbert & Barker Furnaces—a furnace for every purpose.

G. & B. Furnaces are built right. Their construction and design have been perfected by our half century of experience.

We offer you the benefit of this experience and thorough knowledge of modern heat-treating methods through our engineering department. The service is free. Put your problems up to us.

Just now we are making prompt delivery of these two types and many others. Send for Stock List 24.



TYPE C-15

Gilbert & Barker Mfg. Co. West Springfield, Mass.

Canadian Agents:
James DeVon, 227 Davenport Rd., Toronto, Ont. Williams & Wilson, Montreal, Que.

The Oven Equipment & Manufacturing Company
NEW HAVEN, CONN.

"CRAWFORD SECTIONAL" OVENS

Heated with our Enclosed Flame Gas Burners, or Electricity

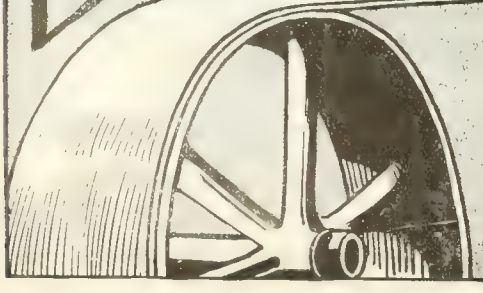
FOR BAKING JAPANS AND OTHER FINISHES ON METAL.

Ovens carried in stock and built to meet requirements of manufacturers.

Builders of All-Steel Oven Trucks with Roller Bearings.

Canadian Representatives: The A. R. WILLIAMS MACHINERY COMPANY, Ltd.
ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER

Scandinavia Belts



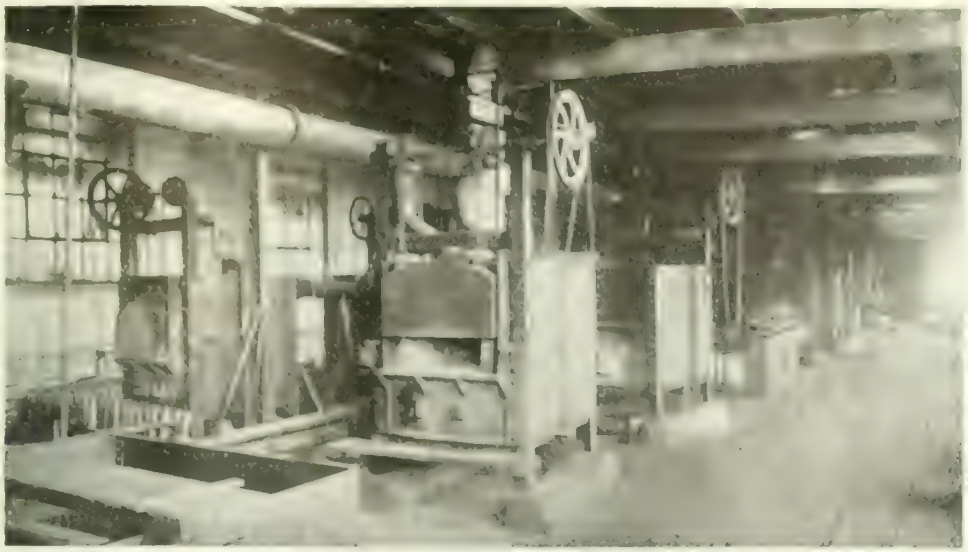
Can be used anywhere that leather can be used.

Scandinavia Belting is a solid woven cotton belt, made of long fibre cotton. It is impregnated to give further solidity, and the impregnation also acts as a moisture resistant. For direct drives where atmospheric conditions remain approximately the same, this belt is probably the best on the market to-day.

It stands up well on shifters.

W. P. BENNETT
51 Montfort Street, Montreal, P.Q.

Beltings *Packings* *Asbestos*



Annealing and Tempering Furnaces installed in the plant of the Canadian Vickers, Limited, Montreal.

"Mecol"

The installation of "Mecol" furnaces shown here is but one instance where a quality furnace was chosen to give maximum production. The furnace you may require is the one we desire to give you complete and full information about. Write us.

Mechanical Engineering Co.
Limited
THREE RIVERS QUE. CANADA

James McKay Company
Pittsburgh, Penna., U.S.A.

Manufacturers of

Shell Forgings

We have the Equipment and Experience and can execute orders for

Nose Sockets Base Plates Adapter Plates

for any size shells. Can execute orders promptly.

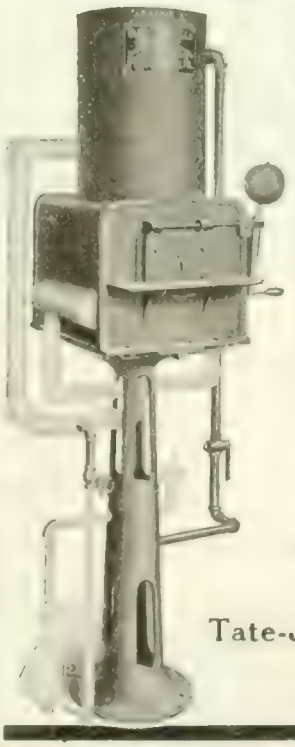
SPECIAL FORGINGS—We can make any forgings that can be made under Drop Hammers.

CHAINS AND ACCESSORY FORGINGS—We have a complete line.

ADDRESS OUR REPRESENTATIVE:

JOHN A. BUCHANAN
King Edward Hotel, TORONTO

This furnace turns back to its owner ¼ of every dollar ordinarily spent for fuel



tive furnace for accurate temperature work — for heats from 900 to 1600 [illegible] natural gas.

The recuperator utilizes the gases of combustion for preheating the air for combustion, thereby effecting a saving in fuel of 25 per cent.

The fire brick linings are of molded tile of the highest quality. Between these linings and the outer shell is one inch of a special insulation which is equivalent to 9 inches of fire brick in its prevention of heat loss.

The interior design of the brick permits 100 per cent. of the available radiant and radiated heat to be thrown to the work. Other furnaces, under practical tests, show only half this much.

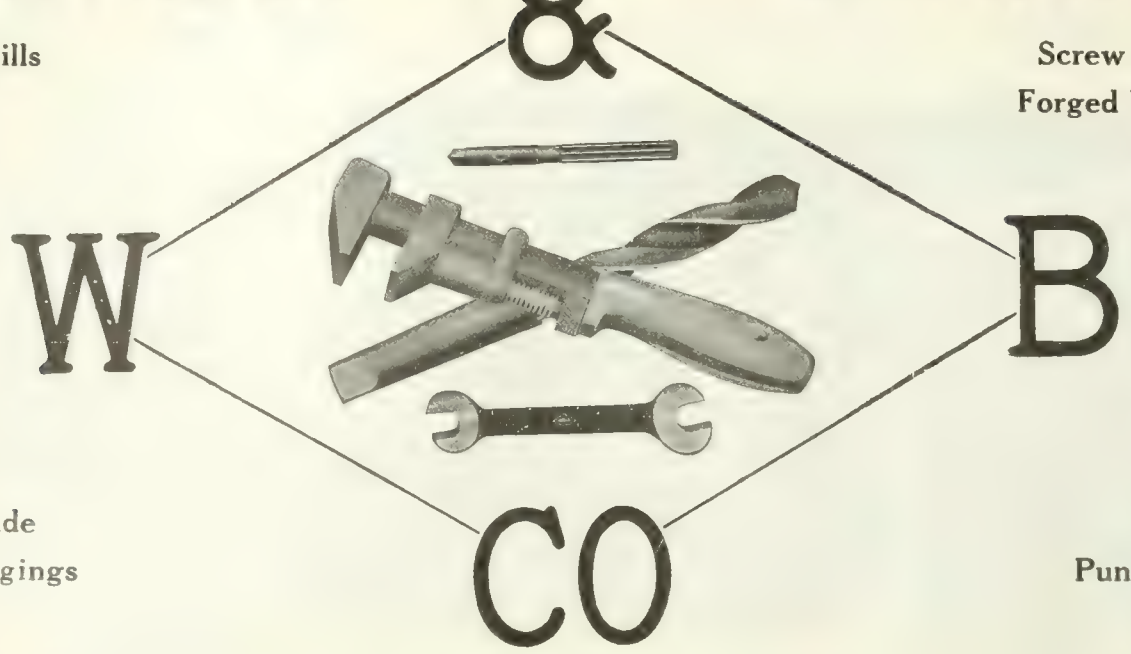
Tate-Jones
Recuperative Gas Oven Furnace
Series A
Write for Bulletins which explain this furnace.

Tate-Jones and Company, Inc.
PITTSBURGH, PA.
FURNACE ENGINEERS

WHITMAN & BARNES

Twist Drills
and
Reamers

Screw and Drop
Forged Wrenches
Hammers



Special
High Grade
Drop Forgings

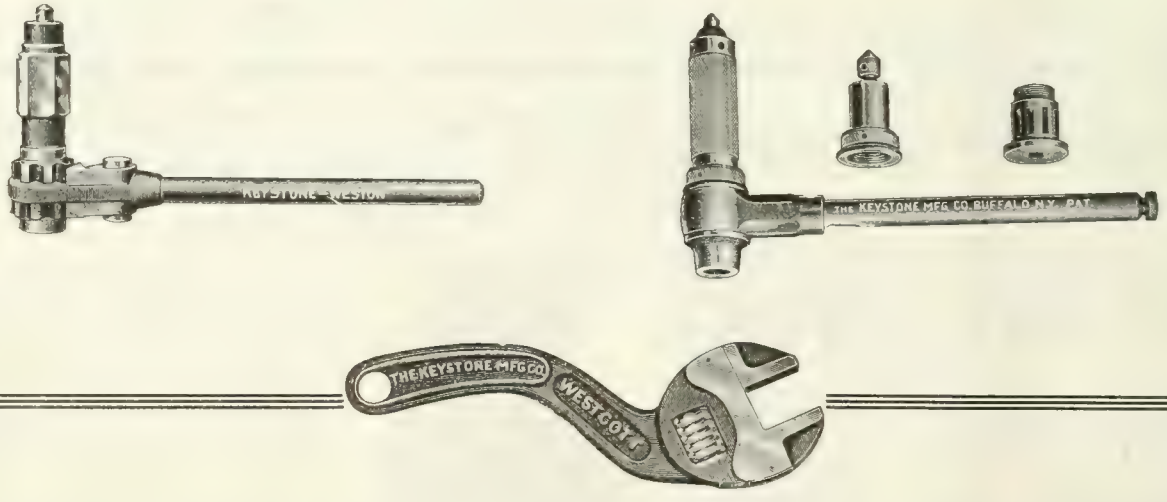
Cotters
Chisels
Punches, Etc.

Users recognize "W & B" Tool Quality, backed by 64 Years' Uninterrupted Experience. If your Jobbers and Dealers cannot supply, write us and we will see that you are supplied. Send for Catalog No. 90.

THE WHITMAN & BARNES MFG. CO.

ESTABLISHED 1854

CANADIAN OFFICE AND FACTORY ∴ ∴ ST. CATHARINES, ONTARIO



Convenience Quality

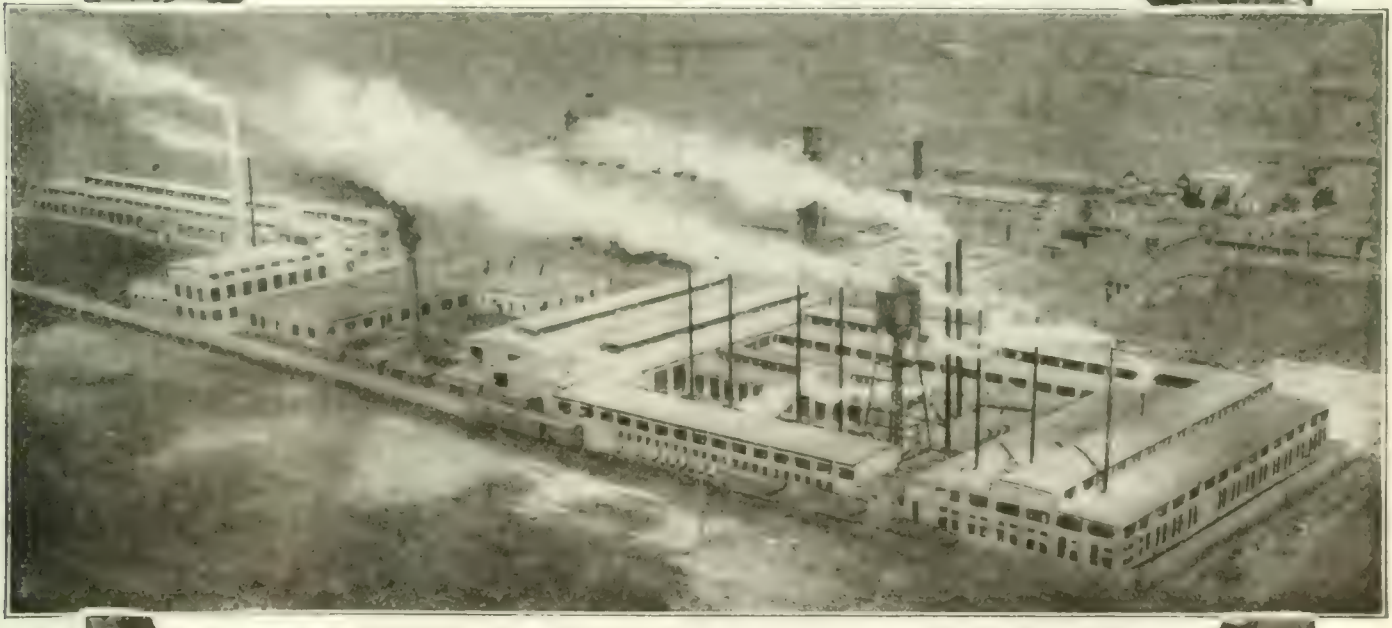
Keystone tools bear the stamp of quality that makes them to be desired because they are made in the most convenient shapes and give the maximum in service and economy.

Our ratchets and adjustable wrench illustrated here are samples of our line. The Keystone brand are carried by the best houses. Inquire of your dealer.

The Keystone Mfg. Co.

BUFFALO N.Y. U.S.A.

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.



Brown's Copper & Brass Rolling Mills, Limited

General Offices and Works:
New Toronto, Ontario, Canada

COPPER & BRASS
BROWN'S
QUALITY
ROLLING MILLS

FORD TRIBLOC

Men Can Watch Their Work; The Hoist Needs No Watching

It's equipped with the Ford patented LOOP Hand Chain GUIDE that prevents "gagging" of the hand chain and damaging of the blocks. All the working parts are made of steel they surely do not need watching as they have a factor of safety of 31/2 to 1.

If you must watch something, watch the mails for our new Catalogue 3. Write for it to-day.

FORD CHAIN BLOCK & MFG. COMPANY
139-141 OXFORD STREET PHILADELPHIA, PA.
2097-D

SMOOTH-ON

TRADE MARK-REG.U.S. PAT.OFF.

Iron Cements

Positively stop all leaks of steam, water, fire or oil in iron or steel. Unequalled for smoothing over rough and defective castings.

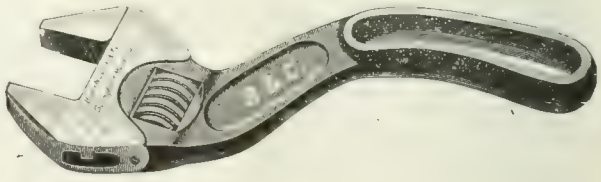
Smooth-On Cements are easy to apply, harden quickly and make permanent repairs.

Every Engineer should have a copy of our new illustrated instruction book. It is free.

Smooth-On Iron Cements are sold by supply houses.

Smooth-On Mfg. Co.
JERSEY CITY, N.J. U.S.A.

Send for New No.16 Illustrated Instruction Book



TRADE B&C MARK

Convenience

This wrench will conveniently get at that nut "just around the corner" or in other inconvenient places where a straight handled wrench would be awkward. Easily operated and handled by one hand. We can give you service and good prices.

BEMIS & CALL
Hardware & Tool Company
Springfield Mass., U.S.A.

BETTER THAN "GENUINE"

ATLANTIC ICE & COAL CORPORATION.

Athens, Ga.,
Dec. 19, 1916.

The Magnolia Metal Co.,
New York, N.Y.

Gentlemen,—

For your information wish to advise you I have recently used your Magnolia metal on our large engine where I formerly used Genuine babbitt which cost just twice the price of Magnolia, and find that Magnolia is as good if not better, and I will continue to use Magnolia babbitt as long as I can get it. I do not hestitate to recommend it to engineers, where a good metal is required.

Yours truly,
ATLANTIC ICE & COAL COR.
Francis Jackson, Supt.

PRACTICAL ENGINEER POCKET BOOK:

Over 600 pages. A valuable reference work imported from England and sold as an advertising medium at the low price of 40c post paid.

Address Montreal Office.

SOLD BY LEADING DEALERS EVERYWHERE OR BY

MAGNOLIA METAL CO.

OFFICE AND FACTORY:

225 St. Ambroise Street Montreal

The WHITING CONVERTER

The increasing demand for steel castings on machinery of all kinds and the savings effected by the side-blow converter process proves that

It Pays to Make Your Own Steel Castings

right at home.

A more uniform product of whatever analysis required, reduced pattern expense, and castings when you want them are some of the reasons why every user of steel castings should investigate the Whiting Converter.

Write for Catalog 129

Complete Foundry Plants

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.

Cranes of all Types

RELIABILITY

is an important quality of Famous Five files.

You can depend upon them to stay sharp for the longest possible time.

This is insured by the quality of our high carbon steel; the efficiency of its heat treatment; the perfection of our manufacturing process and the accuracy and evenness of the teeth.

Their RELIABILITY has made them standard grade tools in the estimation of all mechanics.

Specify them when ordering.

They are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE

Made in Canada by

STEEL STAMPS

FOR MARKING SHELLS, ETC.

We will Give You Satisfaction on All Work of this Kind

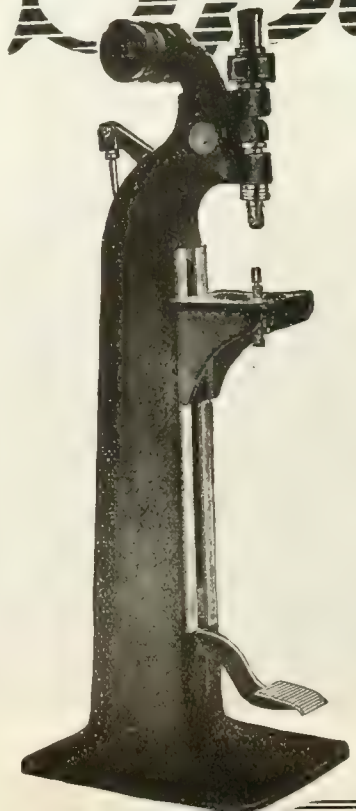
SEND FOR PRICES

Pritchard-Andrews Co., of Ottawa

General Engravers and Die Sinkers

264 SPARKS ST. OTTAWA, CANADA

Speed



When the quality of the work is the best obtainable, the next item is speed. For upon speed depends your costs.

One rivet per second is the speed this machine will maintain indefinitely. Adapt that speed to your requirements and find out the value the Grant Riveter would be to you.

Write for our catalogue. It will give you complete information.

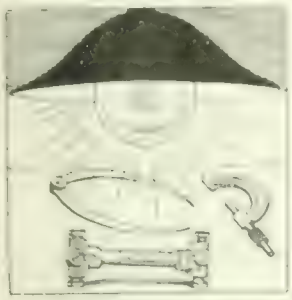
Grant Mfg. & Machine Company

Bridgeport, Conn., U.S.A

HACK "STERLING" SAWS

MANUFACTURED BY

DIAMOND SAW & STAMPING WORKS -:- BUFFALO, N.Y., U.S.A.



GOOD LIGHT AND ACCURATE TOOLS Add To Quality And Increase Production

There's an old saying—

"Neither men nor fools
Can work without tools"

and in these days of high speed, high production and night shifts, one of the most indispensable tools in your shop is GOOD LIGHT

LACO NITRO LAMP "THE LIGHT THAT GIVES MORE LIGHT"

puts the equivalent of bright soft sunlight in your workshop. It gives your men a better light by day, avoids harsh and big machines with costly accessories, both day and night.

LACO NITRO LAMPS reduce eyestrain, prevent labor and material losses, and reduce the hazard of accident and error.

The LACO NITRO LAMP represents the latest development of the tungsten electric lamp. It is a 'tungsten filament' in a nitrogen gas-filled bulb. Less current consumption—greater light and longer utility.

Inquire from your nearest dealer.

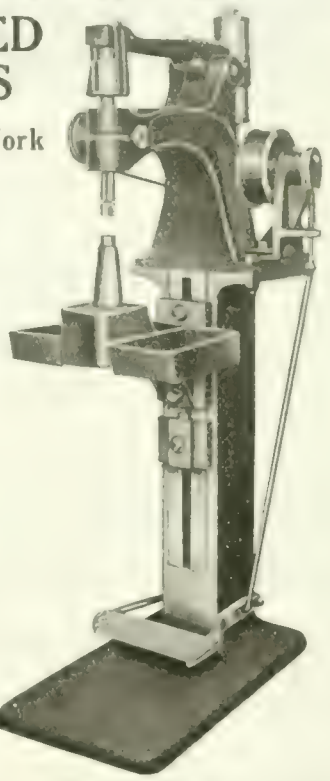
Canadian Laco-Philips Co., Ltd.

Stocks available at

Montreal Toronto Winnipeg Vancouver

HIGH SPEED HAMMERS

For High Speed Work



FEATURES:

Economy in floor space, elimination of weight and a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

No riveting too intricate for us; no riveting which our machine cannot accomplish.

Send for our **High Speed Hammer Book.**

THE HIGH SPEED HAMMER CO.

Rochester, N.Y.

Sales Agents: The A. R. Williams Machinery Company, Limited, Toronto, Ontario.

BRASS Castings

The coupling of expert work with unexcelled equipment enables us to produce on a large scale Brass Castings of any size or alloy.

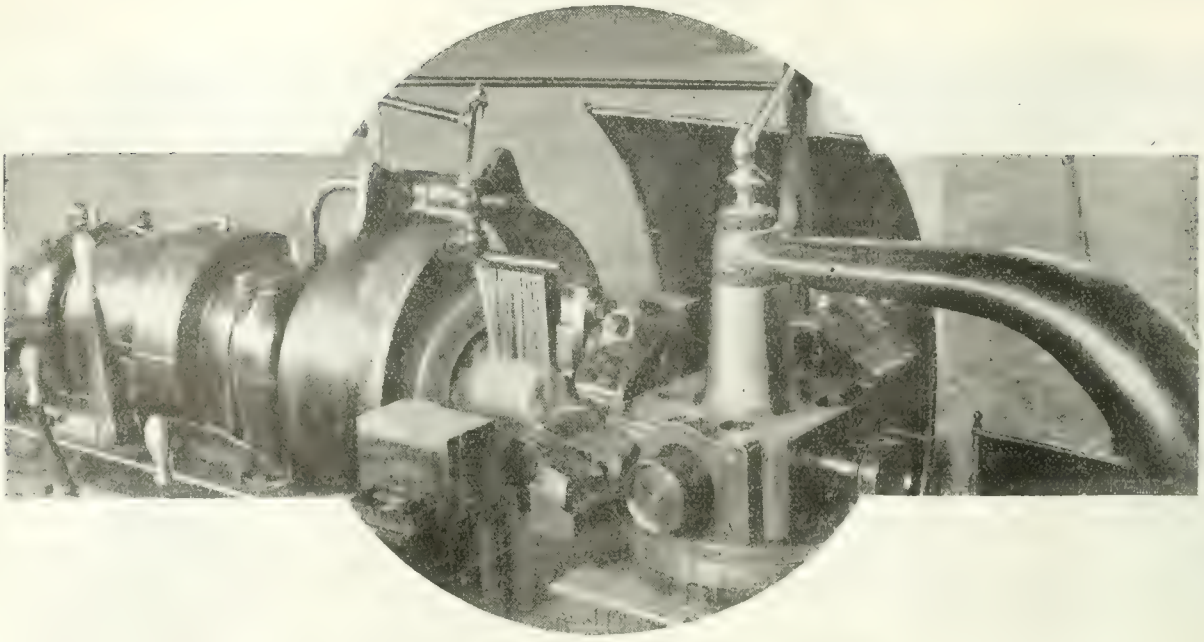
Our prices, too, are most reasonable; for our large purchases direct from the smelters command their every price favor.

For better Brass Castings at a money saving, send your orders to us. We promise that our work will please you.

The St. Lawrence Welding Company, Ltd., Montreal, P.Q.

Manufacturers of Steel Tanks, Air Receivers, Welded Tanks, Etc. Electric Welders, Oxy-Acetylene Welders. Boiler Repairs. Lead Burning and Brass Foundry Work.

Office: 138 Inspector Street Works: 59 Olier Street Telephone: Office, Main 5779, Manager's Res., Westmount 3483



MYSTIC CUTTING COMPOUND

A free-flowing, unsaponified animal oil lubricant. Does not separate in solution, grow rancid or cause rust. It is non-combustible and will not harm operator's hands.

Mystic Cutting Compound increases production and keeps tools in best of condition. Your machines need it. Your operators like it. Test it at our expense.

Cataract Refining Co., Limited, Toronto, Ont.

DEPENDABILITY

Has Made

HARRIS HEAVY PRESSURE

THE MOST POPULAR BABBITT METAL IN THE DOMINION

Manufactured by

THE CANADA METAL CO., LTD.

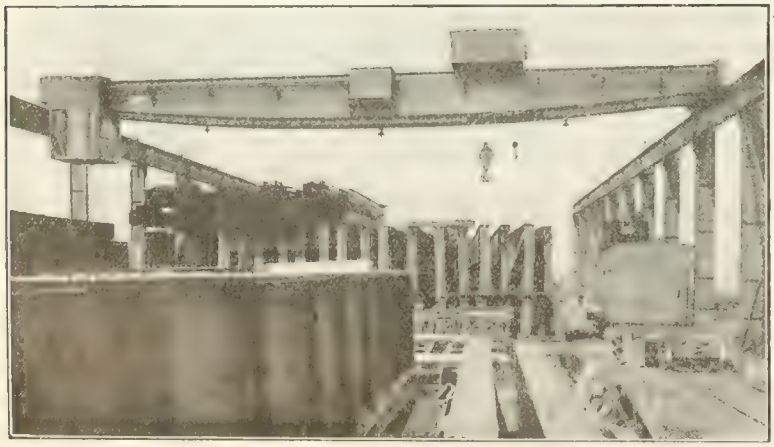
Hamilton, Montreal, TORONTO, Winnipeg, Vancouver

IT FLOWS FREELY

IT WILL NOT CRACK

IT IS COPPER COATED

IT IS COPPER HARDENED



Electric Travelling Cranes

(Direct or Alternating Current)

Steam and Electric Derricks

(Stationary or Travelling)

Up-to-date design. Built for fast, continuous service.

ACCESSIBILITY—DURABILITY.

Dominion Bridge Company, Limited

MONTREAL

ISN'T THIS RATHER GOOD EVIDENCE THAT THE

Morse Silent Chain

IS DEPENDABLE?

THE above insert shows them operating the DIVING CONTROL in United States submarines. Could DEPENDABILITY be more essential anywhere? They also operate the STEERING APPARATUS and the PUMPING SYSTEM. Ever since the Government made comparative tests of all makes of silent chains (prior to the awarding of the contract for chains to operate the Panama Canal Emergency Gates), and discovered that MORSE SILENT CHAINS were of much higher tensile strength and much smoother running than any other make, Government specifications of all sorts are usually met only by "MORSE."

Why Don't You Profit by the Government's Experience?

MORSE CHAIN CO., Ithaca, N. Y.

If any advertisement interests you, tear it out now and place with letters to be answered.

CHAPMAN

DOUBLE BALL BEARINGS

Chapman Double Ball Bearings fit any adjustable hanger and the change can be made with but little delay to you.

Used in over 2,000 Canadian Factories. They have other good points too. Ask us to send full details.

The ordinary line shafting consumes from 15 to 60 % of power developed—

But the line shafting that's equipped with Chapman Double Ball Bearing will save 75 per cent of the friction loads making an average total saving of power from 15 to 30 per cent.

The Chapman Double Ball Bearing Company of Canada, Ltd.
339-351 Sorauren Ave., TORONTO, Canada

TRANSMISSION BALL BEARING CO., Inc.
1050 Military Rd., Buffalo, N. Y.

Clipper Belt Lacer Co.

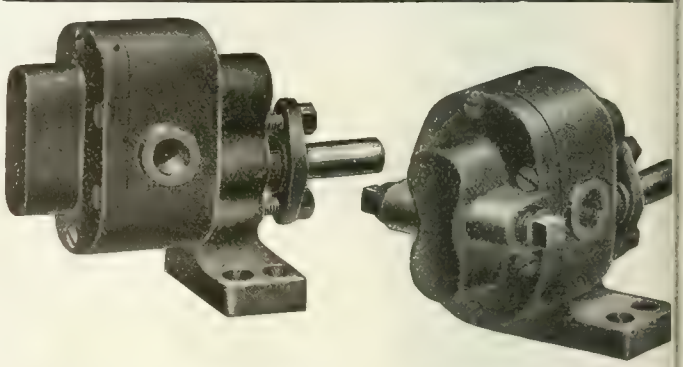
Clipper Belt Lacer Co.

THE real cost of an article is not the price, but the use. To-day the value of things is based on what they can do, not on their purchase price.

The adaptability of the "Clipper" Belt Lacer to nearly every belt in your plant renders the "Clipper" invaluable to you.

Three minutes is the maximum time required to "Clipper" lace a belt.

Clipper Belt Lacer Company
976 Front Avenue Grand Rapids, Mich.

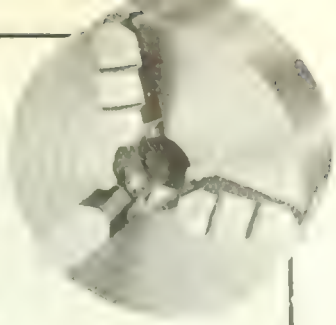


Circulating Pumps

Eliminate the separate relief valve and its necessary piping by installing the Roper Circulating Oil Pump. But, you say, why install a new system when the present is good enough? This "good enough" article may appear to be giving satisfaction, *but,* is it giving the best to be obtained. Can you speed up without any fear? With a Roper you need not have any fear of any kind. The oil flows from it in a steady, even stream, and then you can speed up to full capacity and let her go feeling confident.

Inquire. You will get valuable information anyway.

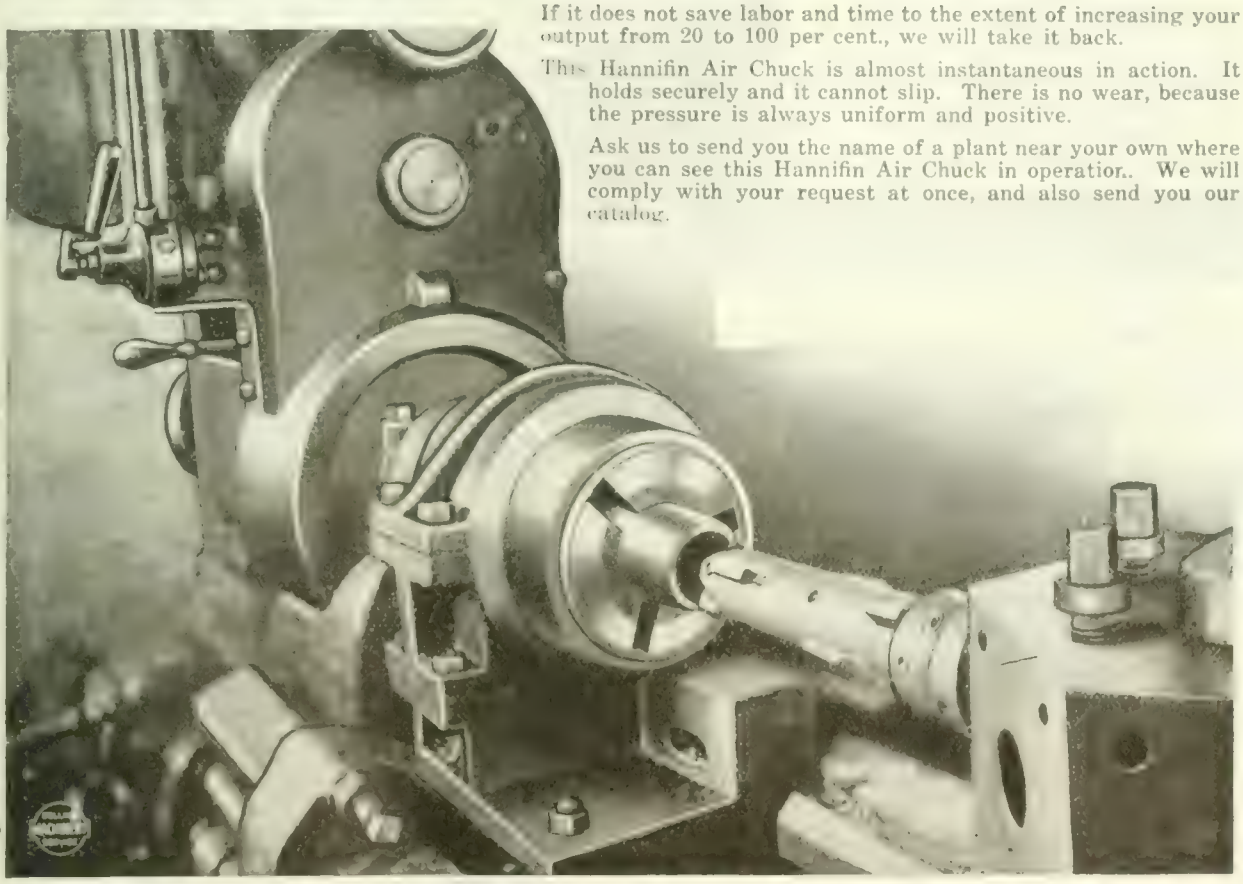
C. F. ROPER & CO.
Hopedale : Mass. : U.S.A.



Order on Trial Let it Prove its Own Case—You the Judge

If we are overconfident, it is because we have never seen a Hannifin Chuck fail. On the other hand, in American and Canadian plants too numerous to mention here, we have seen the Hannifin Chuck increase output from 20 to 100 per cent. So we say to you: Order on trial.

This HANNIFIN Air Chuck



If it does not save labor and time to the extent of increasing your output from 20 to 100 per cent., we will take it back.

This Hannifin Air Chuck is almost instantaneous in action. It holds securely and it cannot slip. There is no wear, because the pressure is always uniform and positive.

Ask us to send you the name of a plant near your own where you can see this Hannifin Air Chuck in operation. We will comply with your request at once, and also send you our catalog.

Hannifin Manufacturing Company

Chicago

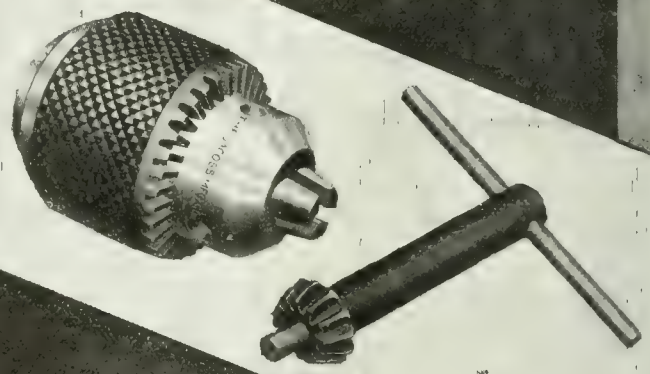
U.S.A.

Representatives: The Canadian Fairbanks Morse Co., Montreal; Knox-Andresen Co., Empire Bldg., Pittsburg, Pa. European Representatives: Coats Machine Tool Co., London; Fenwick, Freres & Co., Paris; Iznosskoff & Co., Petrograd.

Representatives: R. E. Ellis Engineering Co., Chicago; A. R. Williams Machinery Co., Toronto; Williams & Wilson, Montreal; C. C. Firmin, 602 Kerr Bldg., Detroit, Mich.; Carl Naumann, 411 Seitz Bldg., Syracuse, N.Y.

If any advertisement interests you, tear it out now and place with letters to be answered.

Jacobs
IMPROVED
Drill Chuck

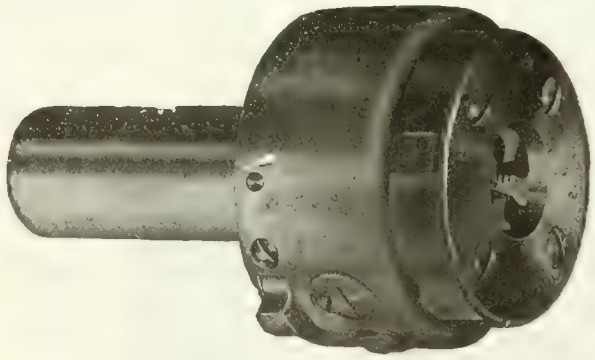


A Winner
By Sheer Merit

Jacobs Improved Drill Chucks are recognized as the STANDARD the world over. Once tried—always used.

Try them and see for yourself.

MADE BY
The Jacobs Manufacturing Co.
Hartford, Conn., U.S.A.



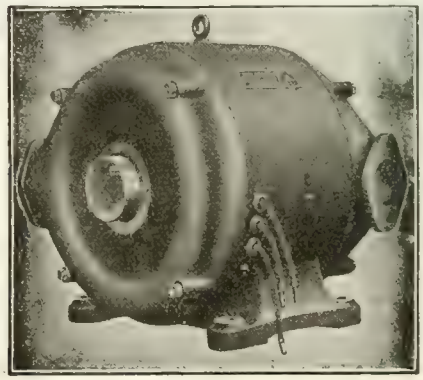
This Point is Valuable

The chasers are set and held in place by a cam. That cam once adjusted, locks; there is no stopping or changing in size. This H. & G. Automatic Self-Opening Die Head has a quick release that not only issues the cutting of the thread to a given point every time, but permits cutting right up to a shoulder when required. Our booklet will tell you more. Write for it.

Eastern Machine Screw Corp.
New Haven, Conn., U.S.A.

The Lancashire Dynamo & Motor Company, of Canada, Limited
107-109 Duke Street, TORONTO

ELECTRICAL MACHINERY for all Purposes.
ELLIOTT BROS'. { INSTRUMENTS / RECORDING GAUGES



PIPE VENTILATED A C MOTOR
FOR VERY DIRTY PLACES

If what you need is not advertised consult our Buyers' Directory and write advertisers listed under proper heading.

Murchey

EQUALS 10 SOLID TAP LIVES

That point alone is sufficient to stamp Murchey adjustable taps as the undisputed leader of its class.

The point is this—when a chaser on a Murchey Tap is ground it can be adjusted to compensate for wear; with a solid tap this cannot be done with the fineness, the finish, the absolute accuracy that characterizes our adjustable taps. A solid tap will lose its accuracy, and the more grindings the greater the inaccuracy. We maintain a special chaser service for our clients.

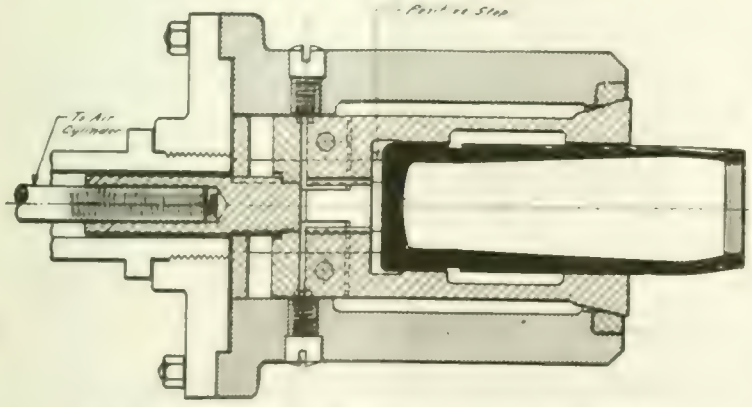
The Murchey Adjustable Tap has other features which we will gladly furnish upon request.

MURCHEY MACHINE & TOOL CO.

75 Porter St. Detroit, Mich.

The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England
Fenwick Freres & Co. 16 Rue Fenelon Paris, France

EVERY MINUTE EVERY DAY PRODUCTION SPEEDED



M. E. C. THREE JAW HINGED COLLET CHUCKS

with steel body are almost everlasting. Not one complicated part to get out of order. Grip firm and positive, their simple air valve control greatly facilitates the quick insertion or withdrawal of work.

Instead of wasted minutes chucking with slow hand-operated chucks, do the same work in seconds, and do it better, with M. E. C. Three Jaw Chucks—compressed air operated.

M. E. C. Chucks
Air Operated

are 100% efficient wherever rapid manufacturing and absolute accuracy are the demands.

Know what great helps to speed production M. E. C. Chucks and Air Cylinders have proved themselves. Write to-day for our catalogue and 30-day free trial plan.

Manufacturers Equipment Company

175-179 North Jefferson St., CHICAGO, ILL.

CANADIAN AGENTS: J. R. Stone Tool and Supply Co., Detroit, Mich.
New York: J. R. Stone Tool and Supply Co., 130 Church St.

Escaped from Germany

AN escaped prisoner tells the story of his fearful experiences in Germany in MACLEAN'S MAGAZINE for November; and gives a vivid picture of conditions in Germany as he saw them. He got out by way of Holland after appalling perils and hardships. In Holland, he was photographed, but so altered was he that his wife quite failed to recognize him in this photograph. Read this story of this Canadian soldier's escape. It is gripping stuff—a rare tale.

Canadian Finances After the War

WILL business in Canada collapse when peace comes? It may. What do the big men say? What do they know? What do you think? Are your opinions well informed? The subject is of the greatest possible importance, and you will get light and leading by reading the contribution of Col. John Bayne Maclean, who has taken the trouble to get the opinion of the biggest and most highly placed men in Canada to help him prepare his article.

Back from the Arctic

WILLIAM THOMPSON, representing the American Geographical Society, was this year in the Arctic Regions. He went to the delta of the Mackenzie River, and took many excellent pictures of the country and its Eskimo inhabitants. He makes the November MACLEAN'S the vehicle of many of his pictures and for an account of his journey. Read what this Arctic scientist has to tell us about a remote part of our land.

Slackers and Conscription

WHAT is your attitude towards the draft? You have positive opinions, of course. How do they square with Miss Laut's as they are expressed in her ringing article on Slackers in the November MACLEAN'S?

The Nation's Business

THIS is a new feature—a fearless, well-informed survey of national affairs. What we all want is an outspoken—but not vindictive—and clear-visioned presentation of factors and facts affecting our national, political and economic welfare.

Sketches of Trench Life

By Gunner McRitchie

MCRITCHIE was a cartoonist on a Western Canada daily before he went overseas. He has done a number of sketches of trench life "On the Spot," and these he has sent home, for publication in MACLEAN'S MAGAZINE. They're interesting and good.

The Late Sir Mortimer Clark

BEFORE he died, a few weeks ago, the late Sir Mortimer Clark, eminent jurist and an ex-Lieutenant-Governor of Ontario, wrote for MACLEAN'S an article on "Safeguarding Your Heirs." It has to do with the functions, service and safety of Trust Companies as executors of estates. This article by a man so distinguished, so cautious, so able, and so wise a counsellor, can be of first-rate value to every man perplexed with the problem of how his estate can be safely and prudently administered after he, the testator, has passed from this life.

A Complete Novelette

By Peter B. Kyne

HIS story in the November MACLEAN'S is a thunderingly good story of lumbermen and lumbering. Red blood is in this tale of business. R. M. Brinkerhoff illustrates it.

Short Story

By Ethel Watts Mumford

THE writer of this short story—the first of a delightful series by this author to appear in MACLEAN'S—is very well known among short story writers. Delicate fancy, wholesomeness, freshness and finished workmanship characterize all her work.

Short Story

By W. A. Fraser

A MIGHTILY well-written story of India—the kind that we all delight in; tense, bewildering, and lots of action. Fraser never wrote a better short story than this. Ben Ward illustrates it.

Hendryx and Oppenheim

SERIALISTS

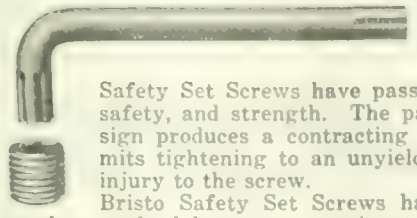
"THE Gun Brand," by Hendryx, comes to an end in the November issue. Oppenheim's greatest story, "The Pawns Count," is continued. Oppenheim's story is the biggest single feature ever secured by MACLEAN'S.

MACLEAN'S MAGAZINE

for November At All News Dealers **15c.**

HINTS TO BUYERS

BUILDERS OF MACHINERY
WHAT SET SCREWS DO YOU USE?

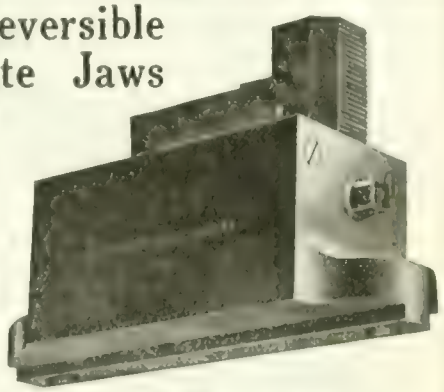


TRADE MARK
BRISTO

Safety Set Screws have passed every test for safety, and strength. The patented fluted design produces a contracting effect which permits tightening to an unyielding grip without injury to the screw.
Bristo Safety Set Screws have been adopted as the standard by many prominent machine builders.
Ask for free samples and Bulletin I-809.

THE BRISTOL CO., Waterbury, Conn.
U. S. A

Skinner Reversible Face Plate Jaws



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Write for illustrated catalog.
Iron or Steel Body, Single Rib for Large Lathes and Double Ribs Boring Mills

THE SKINNER CHUCK CO.
Factory and Main Office: New Britain, Conn.
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Uncertainty becomes Certainty when you have your material and apparatus tested and inspected by us.

Get the benefit of many years of service.

CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED
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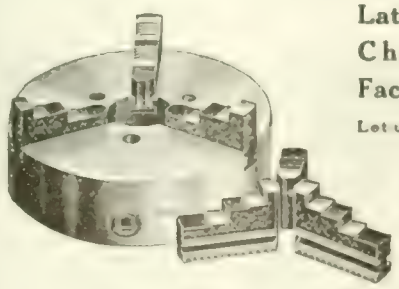
STEEL CASTINGS

We are well equipped to make all kinds of steel castings, 100 lbs. to 50,000 lbs.

Dominion Steel Foundry Co.
Hamilton LIMITED Ontario

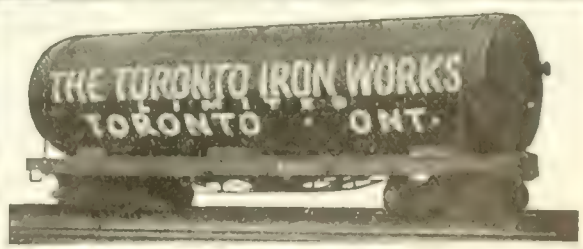
Cushman Chucks



Lathe Chucks, Drill Chucks, Portable Face Plate Jaws.
Let us send you our catalog.

The Cushman Chuck Co.
Hartford, Conn., U.S.A.

RIVETED STEEL TANKS FOR EVERY PURPOSE



OIL STORAGE - GASOLINE TANKS - AIR RECEIVERS
PNEUMATIC WATER SUPPLY TANKS - SMOKE STACKS
BOILER BREECHING - RIVETED STEEL PIPE - BINS & HOPPERS

Northern Crane Works
LIMITED
WALKERVILLE ONTARIO
Electric Cranes

NORTHERN CRANES

CRANES
MADE IN CANADA
Electric Hoists
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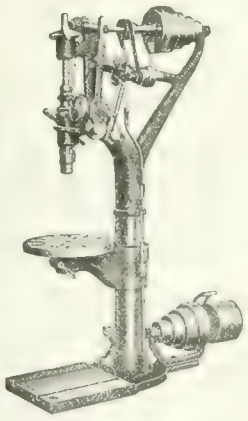
Cupolas



20" Swing Drills in four distinct styles. Plain lever feed, lever and wheel feed, power feed and automatic stop, and with back gearing. Made singly or in 2, 3 or 4 spindle gangs. Write us for complete information and Catalogue No. 62; also for particulars on our new 25" Drilling Machine.

The Silver Mfg. Company

Box 290 Salem, Ohio

SILVER

Zenith Coal & Steel Products Limited

COAL COKE HACK SAW BLADES

CARBON STEEL MACHINERY STEEL

HIGH SPEED STEEL

Royal Bank Bldg., Toronto; McGill Bldg., Montreal, Que.

Every Tooth Cuts on Every Quality Saw

They cut straighter.

They last longer.

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FOR ALL KINDS OF HEAVY LIFTING

Send for complete catalogue showing 50 styles 10 to 100 tons capacity.

Made only by **A. O. NORTON, Limited**

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Greenfield

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A universal grinder. A grinder with all attachments. A grinder that will handle all kinds of tool-sharpening as well as cylindrical, internal and surface grinding. An all-around machine for your tool-room.

Catalog No. 6.

Greenfield Machine Co.

Greenfield, Mass., U.S.A.

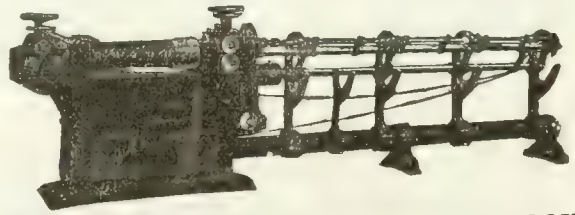
Adjustable and Rustproof

WILLSON SAFETY GOGGLES

Can be worn over other glasses

FOR MUNITION WORKERS Send for details.

T. A. Willson & Co., Inc. Canadian Office, 23 Scott St., Toronto



THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's $\frac{3}{4}$" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

May we send you catalogue C?

The F. B. SHUSTER COMPANY, New Haven, Conn.

Formerly John Adt & Son. Established 1866.

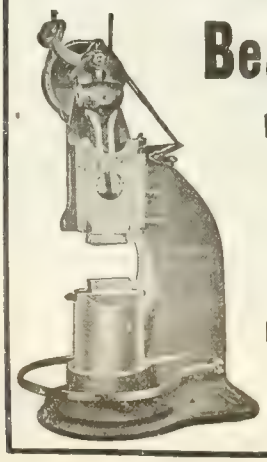
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

Cut Boring Expenses

ACTUAL TESTS under trying circumstances have proven that boring expenses may be cut in half by using the DIXON PATENT BORING TOOL. License to make this tool may be purchased outright. Get in touch with me.

C. L. DIXON

278 Old Orchard Ave., N.D.G., Montreal, Que.



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FOR GENERAL FORGING

Save Fuel, Time and Labor. Cut Forging Costs in two.

BELT OR MOTOR DRIVEN

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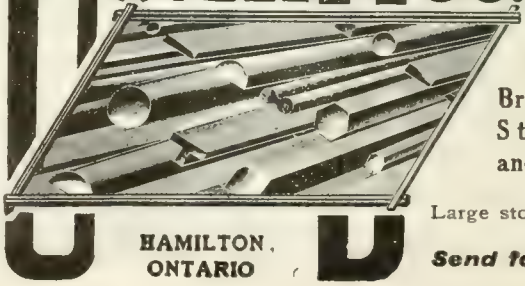

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Manufacturers of

Bright Finished Steel Shafting and Shapes.

Large stock of all sizes.

Send for Price List

End View

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Diamond Grinder Tools

for truing emery and carborundum wheels are giving great satisfaction everywhere because of the hard and high quality diamonds we use. They will keep your abrasive wheels in good cutting condition.

Ask for descriptive circular and let us send you an assortment for selection.

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Established in 1799
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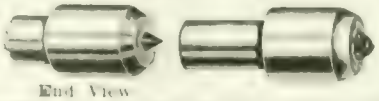
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Hamilton Motor Works, Limited

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PRESSES—ALL TYPES

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Press Attachments, Automatic.
Metal and Wire Forming Machines.
Tumblers—Large Line.
Burnishing Machines. Grinders.
Special Machines.

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Resistal reinforced lenses may be ground to oculist's prescription.

THE STRONG, KENNARD & NUTT CO.
511 Schofield Bldg. Cleveland, Ohio

"THISTLE" BRAND RUBBER BELTING

"Maintenance of Quality"

is our motto, and our experience in the manufacture of belting since the year 1856 should be invaluable to you. Let us tell you all about this friction faced belting. The price will appeal to you.

Write to-day.

J. C. McLAREN BELTING CO., LTD.
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PRECISION TOOLS AND EQUIPMENT

Johansson Standard and Shop Gages
Nose Reamers and Sizing
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Send us your inquiries. Let us quote.

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Taylor-Newbold Milling Cutters

Fast Cutting
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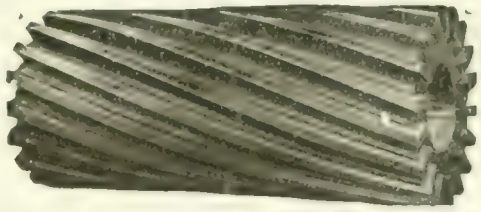

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For Service—Utility—Strength—Power.
4-in. Diameter for General Use.

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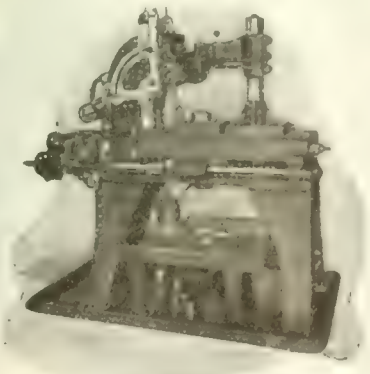


The Whiton
AUTOMATIC
Gear Cutting Machine

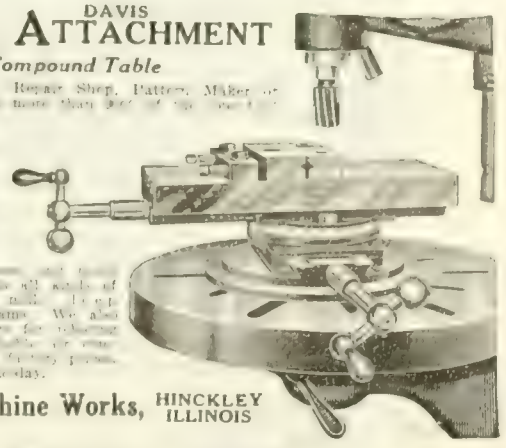
Do you want Catalog?

The D. E. Whiton Machine Co.

NEW LONDON, - CONN.

THE DAVIS MILLING ATTACHMENT

and Compound Table



Hinckley Machine Works, HINCKLEY ILLINOIS

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"FROST KING"

Cuts down your Babbitt Expenses

The enormous demand for **"Frost King"**—sales $5,000,000 annually—is due to its perfection. Forty years have been devoted to the perfecting of white metal alloys, and **"Frost King"** is undoubtedly the highest achievement in babbitts. Its performance under heavy duty and the way it cares for high speed is very gratifying.
Prove these claims by giving it a trial.

HOYT METAL COMPANY

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New York, N.Y. London, Eng. St. Louis, Mo.

HIMOFF MACHINE CO.

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Makers of

Lathes, Turret Lathes and Gear Hobbers

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ALL WOOD—COMBINATION—IRON—STEEL

Every pulley fully guaranteed.
Write for interesting printed matter.

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HEAVY DUTY LATHES

Engine Lathes from 26" to 60" swing; Plain Turning Lathes, 24" and 30" swing; Axle and Journal Turning Lathes and Bevel Gear Turning Lathes. Write for Catalogue.

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Tests of Metals, Fuels, Oils, Water, Etc.
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Oxy-Acetylene Welding and Cutting Apparatus

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TAKE ALL THE **GRIND** OUT OF GRINDING
WITH
WILMARTH & MORMAN GRINDERS
CATALOGUE ON REQUEST
WILMARTH & MORMAN COMPANY, 1200 Monroe Avenue, N. W.
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Manufacturers of Drill Grinders, Surface Grinders, Universal Grinders

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TORONTO HAMILTON WINNIPEG
IRON AND STEEL
HEAVY HARDWARE
MILL SUPPLIES
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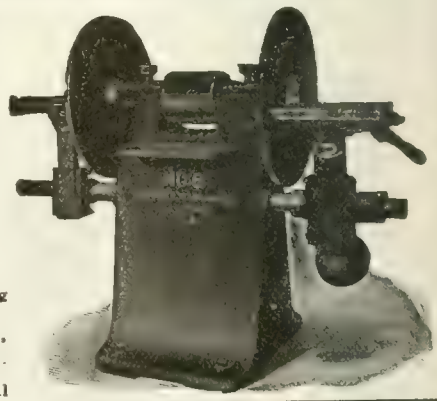
WE SHIP PROMPTLY

Gardner Disc Grinder

Gardner Disc Grinders are made in all sizes, types and combinations. We can successfully mec. any disc grinding problem in existence. Largest builders of Disc Granding machinery in the world.



Gardner Machine Co.
The Disc Grinding Authorities
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WE MANUFACTURE RIVETS of every description, ½ inch. dia. and smaller

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Canada Metal Co., Ltd., Toronto
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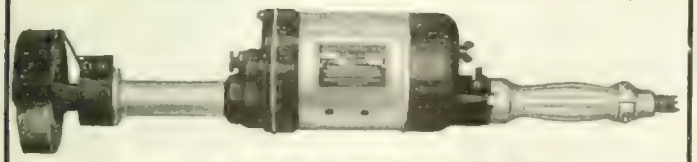

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Petrie, Ltd., H. W., Toronto, Ont.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.

DRILLING POSTS
Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Buffalo, N.Y.
Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH
Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Millers Falls Co., Millers Falls, Mass.
Pratt & Whitney Co., Dundas, Ont.
United States Electrical Tool Co., Cincinnati.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy. Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Petrie, Ltd., H. W., Toronto, Ont
Wilkinson & Kompass, Hamilton, Ont.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.

DRILLS, ELECTRIC AND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Foss & Hill Machy. Co., Montreal.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Petrie, Ltd., H. W., Toronto, Ont
Prest-O-Lite Co., Inc., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont

DRILLS, HIGH SPEED
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
Clark Equipment Co., Buchanan, Mich.
Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Montreal.
Eagle & Globe Steel Co., Montreal, Que.
Foss & Hill Machy. Co., Montreal.
Marshall & Co., Geo. A., Toronto, Ont.
McKenna Brothers, Pittsburgh, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
W. F. & John Barnes Co., Rockford, Ill.
Petrie, Ltd., H. W., Toronto, Ont
Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.

DRILLS, MULTIPLE SPINDLE
Henry & Wright Mfg. Co., Hartford, Conn.
Niles-Bement-Pond Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, OIL TUBE
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

DRILLS, PNEUMATIC
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago, Ill.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York

DRILLS, PNEUMATIC CORNER
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Millers Falls Co., Millers Falls, Mass.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Foss & Hill Machy. Co., Montreal.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
Clark Equipment Co., Buchanan, Mich.
Foss & Hill Machy. Co., Montreal.
Morse Twist Drill & Mach. Co., New Bedford.

DRILLS, TWIST
Atkins & Co., Wm., Sheffield, Eng.
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago.
Armstrong, Whitworth of Canada, Ltd., Montreal.
Canadian Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
Clark Equipment Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilkinson & Kompass, Hamilton, Ont.

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Puro Sanitary Dk'g. Fountain Co., Haydenville, Mass.

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Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

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Canadian Fairbanks-Morse Co., Montreal.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes & Co., Sherbrooke, Que.

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Sheldons, Ltd., Galt, Ont.
Sturtevant Co., B. F., Galt, Ont.

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Sheldons, Ltd., Galt, Ont.
Sturtevant Co., B. F., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

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Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
A. R. Williams Machy. Co., Toronto.

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Canada Wire & Iron Goods Co., Hamilton, Ont.

ELEVATORS AND BUCKETS
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Whiting Foundry Equipment Co., Harvey, Ill.

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Can. Matthews Gravity Carrier Co., Toronto, Ont.

EMERY GRINDERS (PNEUMATIC)
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Stow Mfg. Co., Binghamton, N.Y.

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Foss & Hill Machy. Co., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Ford-Smith Mach. Co., Hamilton, Ont.
Francis & Co., Hartford, Conn.
Norton Co., Worcester, Mass.
Petrie, Ltd., H. W., Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

ENGINES, BALANCED VALVE
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Plessisville Foundry Co., Plessisville, Que.

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Canadian Fairbanks-Morse Co., Montreal.
Johnson Mach. Co., Carlyle, Manchester, Conn.
Petrie, Ltd., H. W., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.

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Johnson Mach. Co., Carlyle, Manchester, Conn.
Petrie, Ltd., H. W., Toronto, Ont.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.

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ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

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Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

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Can. Blower & Forge Co., Kitchener, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Sheldons, Ltd., Galt, Ont.
Sturtevant Co., B. F., Galt, Ont.

FANS
Baird Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton.

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Puro Sanitary Dk'g. Fountain Co., Haydenville, Mass.

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Canada Wire & Iron Goods Co., Hamilton, Ont.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa.

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Atkins & Co., Wm., Sheffield, Eng.
Can. B. K. Morton Co., Toronto, Ont.
Delta File Works, Philadelphia, Pa.
Marshall & Co., Geo. A., Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
Port Hope File Mfg. Co., Port Hope, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
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Williams & Co., J. H., Brooklyn, N.Y.

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Williams & Co., J. H., Brooklyn N.Y

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Pratt & Whitney Co., Hartford, Conn.
Toronto Tool Works, Toronto, Ont.
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Worth Engineering Co., Toronto, Ont.

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D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.

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Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
Illinois Tool Works, Chicago, Ill.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia, Pa.
The Smart-Turner Machine Co., Hamilton.
Winnipeg Gear & Engr. Co., Winnipeg, Man.

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Gardner, Robt., & Son, Montreal.
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Philadelphia Gear Works, Philadelphia, Pa.
A. R. Williams Machy. Co., Toronto.
Winnipeg Gear & Engr. Co., Winnipeg, Man.

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Can. Fairbanks-Morse Co., Montreal.
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Petrie, Ltd., H. W., Toronto, Ont.
Sturtevant Co., B. F., Galt, Ont.
A. R. Williams Machy. Co., Toronto.

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Strong, Kennard & Nutt Co., Cleveland, Ohio.
Willson & Co., Inc., T. A., Reading, Pa.

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Hickory Steel Grip Glove Co., Chicago, Ill.

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Can. Bond Hanger & Cplg. Co., Alexandria, Ont.
Canada Machinery Corp., Galt, Ont
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Ford-Smith Mach. Co., Hamilton, Ont
Foss & Hill Machy. Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
New Britain Machine Co., New Britain, Conn.
Petrie, Ltd., H. W., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.

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Brown & Sharpe Mfg. Co., Providence, R.I.
Foss & Hill Machy. Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
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Norton Grinding Co., Worcester, Mass.
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GRINDERS, DISK
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Gardner Machine Co., Beloit, Wis.

GRINDERS, DRILL
Aikenhead Hardware Co., Toronto, Ont.
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Garvin Machine Co., New York.
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GRINDERS, CYLINDER, INTERNAL
Brown & Sharpe Mfg. Co., Providence, R.I.
Fitchburg Grinding Mach. Co., Fitchburg, Mass.
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Greenfield Machine Co., Greenfield, Mass.
Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Rivett Lathe & Grinder Co., Brighton, Mass.

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Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
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Norton Co., Worcester, Mass.
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United States Electrical Tool Co., Cincinnati, O.
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Wilkinson & Kompass, Hamilton, Ont.

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Ford-Smith Machine Co., Hamilton, Ont.
Greenfield Machine Co., Greenfield, Mass.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wing & Son, J. E., Hamilton, Ont.

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Wilmarth & Morman, Grand Rapids, Mich.

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Ford-Smith Mach. Co., Hamilton, Ont.
Gardner, Robt., & Son, Montreal.
Garvin Machine Co., New York.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
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LeBlond Mach. Tool Co., R. K., Cincinnati.
Niles-Bement-Pond Co., New York.
Petrie, Ltd., H. W., Toronto, Ont.
Wilmarth & Morman, Grand Rapids, Mich.
Stow Mfg. Co., Binghampton, N.Y.

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Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.
Carborundum Co., Niagara Falls.
Ford-Smith Mach Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Francis & Co., Hartford, Conn.
Norton Co., Worcester, Mass.
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New Britain Mach. Co., New Britain, Conn.
Stow Mfg. Co., Binghampton, N.Y.

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Ford-Smith Machine Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Millers Falls Co., Millers Falls, Mass.
Osborn (Canada, Ltd., Sam'l, Montreal, Que.
H. W. Petrie, Ltd., Montreal.
Racine Tool & Machine Co., Racine, Wis.
L. S. Starrett Co., Athol, Mass.
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Victor Saw Works, Ltd., Hamilton, Canada.
Wilkinson & Kompass, Hamilton Ont.
Zenith Coal & Steel Products, Montreal, Que.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
Canadian Billings & Spencer, Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
Erie Foundry Co., Erie, Pa.
High Speed Hammer Co., Rochester, N.Y.
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Plessisville Foundry Co., Plessisville, Que.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.

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Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.

HAMMERS, POWER
Beaudry & Co., Boston, Mass.
Erie Foundry Co., Erie, Pa.
United Hammer Co., Boston, Mass.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
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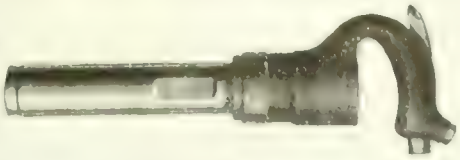

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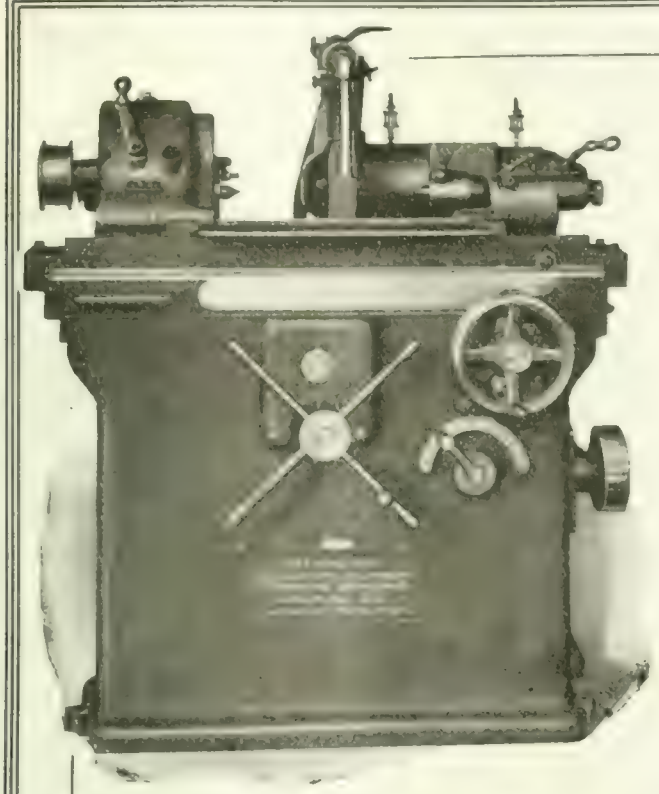

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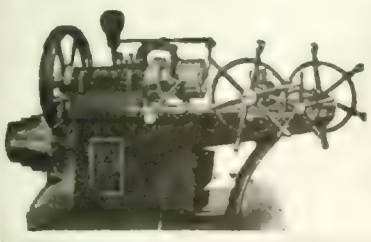

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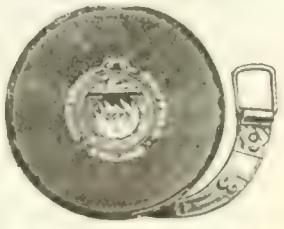

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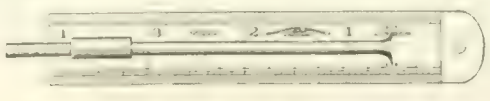

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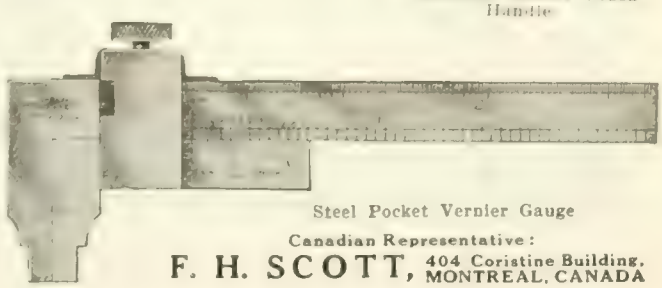

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Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
Smart-Turner Machine Co., The, Hamilton.

OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto

OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING
Brantford Oven & Rack Co., Brantford, Ont.
Oven Equipment & Mfg. Co., New Haven, Conn.
Whiting Foundry Equipment Co., Harvey, Ill.

OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon, Holmes & Co., Sherbrooke, Que.
Oven Equipment & Mfg. Co., New Haven, Conn.
Whiting Foundry Equipment Co., Harvey, Ill.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS
Brantford Oven & Rack Co., Brantford, Ont.
Oven Equipment & Mfg. Co., New Haven, Conn.

OXY-ACETYLENE WELDING AND CUTTING
Can. Welding Works, Montreal, Que.
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

OXY-ACETYLENE WELDING AND CUTTING PLANT
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.

OXYGEN (SEE ACETYLENE)
L'Air Liquide Society, Montreal, Que.

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Bennett, W. P., 51 Montford St., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

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Graton & Knight Mfg. Co., Worcester, Mass.
William R. Perrin, Ltd., Toronto.
Petrie, Ltd., H. W., Toronto, Ont.

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Bertrams, Ltd., Edinburgh, Scotland.
MacKinnon, Holmes & Co., Sherbrooke, Que.
Sturtevant Co., B. F., Galt, Ont.

PATTERN SHOP EQUIPMENT
Canada Machinery Corp., Galt, Ont.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.

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Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.

PATTERNS
Winnipeg Gear & Engr. Co., Winnipeg, Man.

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Steel Co. of Canada, Ltd., Hamilton, Ont.

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Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss & Hill Machy. Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Petrie, Ltd., H. W., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
A. R. Williams Machy. Co., Toronto.

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Toronto Iron Works, Ltd., Toronto.

PIPE CUTTERS, ROLLING
Curtis & Curtis Co., Bridgeport, Conn.
John H. Hall & Sons, Ltd., Brantford, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Petrie, Ltd., H. W., Toronto, Ont.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Petrie, Ltd., H. W., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

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Sheldons, Ltd., Galt, Ont.
Niles-Bement-Pond Co., New York.

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Aikenhead Hardware Co., Toronto.
Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.

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Atlas Press Co., Kalamazoo, Mich.
Hannifin Mfg. Co., Chicago, Ill.
Metalwood Mfg. Co., Detroit, Mich.

PRESSES, BROACHING, FORGING AND FLANGING
Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

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Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.

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Atlas Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
Charles F. Elmes Eng. Works, Chicago.
Ferracute Machine Co., Bridgeton, N.J.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Petrie, Ltd., H. W., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER
William R. Perrin, Ltd., Toronto.

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W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago.
Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Petrie, Ltd., H. W., Toronto, Ont.
Toledo Machine & Tool Co., Toledo.

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Charles F. Elmes Eng. Works, Chicago.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Toledo Machine & Tool Co., Toledo.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.

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Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Charles F. Elmes Eng. Works, Chicago.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.
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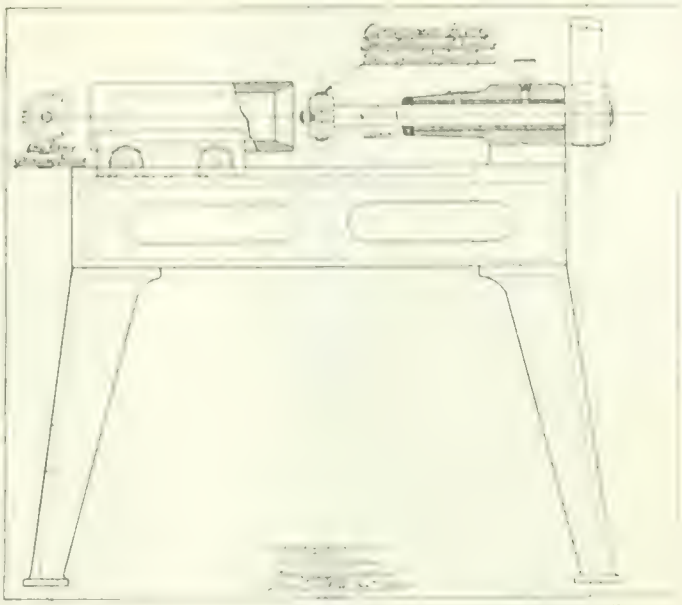

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Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
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Petrie, Ltd., H. W., Toronto, Ont.
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Brown, Boggs Co., Ltd., Hamilton, Canada.
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W. A. Whitney Mfg. Co., Rockford, Ill.

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Can. Hoskins, Ltd., Walkerville, Ont.
Holz, Herman A., 1 Madison Ave., New York.
Shore Instrument & Mfg. Co., New York City.
H. E. Streeter, New Birks Bldg., Montreal, Que.
Taylor Instrument Co., Rochester, N.Y.
Thwing Instrument Co., Philadelphia, Pa.

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Niles-Bement-Pond Co., New York.

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RAIL BENDERS
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Cumming & Son, J. W., New Glasgow, Canada.
Niles-Bement-Pond Co., New York.

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Cumming & Son, J. W., New Glasgow, Canada.

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Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
H. E. Streeter, New Birks Bldg., Montreal, Que.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Clark Equipment Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
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Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Clark Equipment Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

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Grant Mfg. & Machine Co., Bridgeport, Conn.
National Machinery Co., Tiffin, O.

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Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ot.

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Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York
Petrie, Ltd., H. W., Toronto, Ont.

RIVETING MACHINES, ELASTIC ROTARY BLOW
Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

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John Bertram & Sons Co., Dundas
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo, O.

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Canada Machinery Corp., Galt, Ont.
Gardner, Robt., & Son, Montreal
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Tabor Mfg. Co., Philadelphia, Pa.

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Eastern Mach. Screw Corp., New Haven, Conn.

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Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York
Himoff Mach. Co., Inc., Astoria, L.I., New York
A. B. Jardine & Co., Hespeler
New Britain Machine Co., New Britain, Conn.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rivett Lathe & Grinder Co., Brighton, Mass.
Warner & Swasey Co., Cleveland, O.
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A. B. Jardine & Co., Hespeler
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

SCREW SLOTTERS
Garvin Machine Co., New York
Pratt & Whitney Co., Dundas, Ont.

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Dominion Machinery Co., Toronto
Foss & Hill Machy. Co., Montreal
Hill, Clarke & Co., Chicago, Ill.
McCabe, J. J., New York, N.Y.
New York Machinery Exchange, New York
Petrie, Ltd., H. W., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Strelinger Co., Chas. A., Detroit, Mich.
Stocker-Rumely-Wachs, Chicago, Ill.

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Allen Mfg. Co., Hartford, Conn.
Wilkinson & Kompass, Hamilton, Ont.

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Can. Fairbanks-Morse Co., Montreal
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal
Gardner, Robt., & Son, Montreal
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio
Petrie, Ltd., H. W., Toronto, Ont.
Rhodes Mfg. Co., Hartford, Conn.
Steptoe Co., John, Cincinnati, Ohio

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Can. Drawn Steel Co., Hamilton, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
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Niles-Bement-Pond Co., New York
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Strelinger Co., Chas. A., Detroit, Mich.
A. R. Williams Machy. Co., Toronto
Wilkinson & Kompass, Hamilton, Ont.

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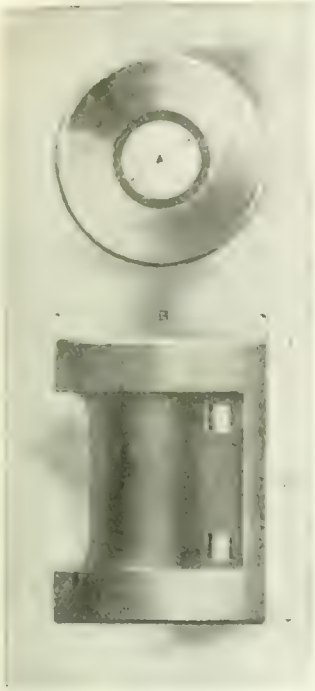

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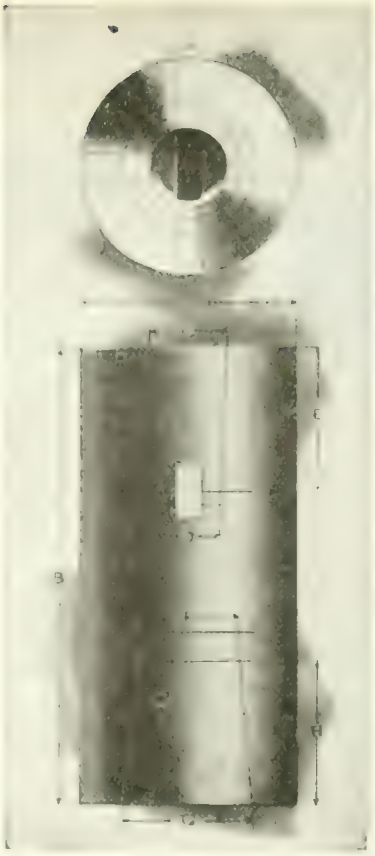
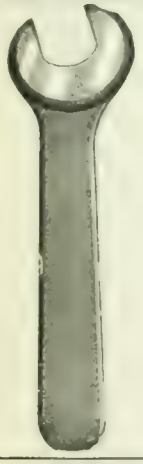


Stamp Head



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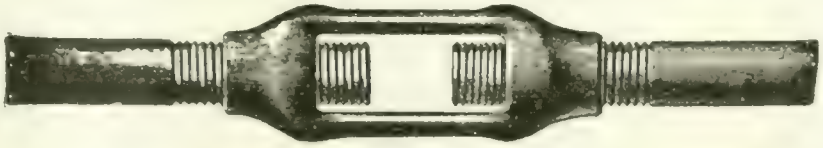

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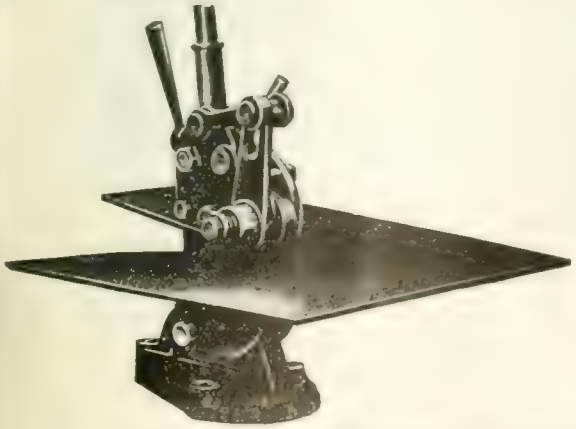

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Can. Pat. No. 167666

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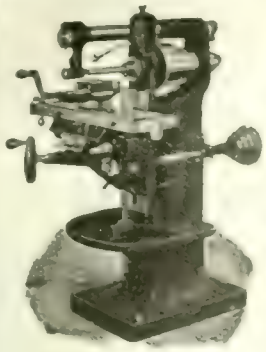

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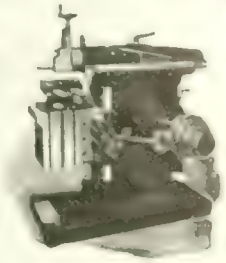

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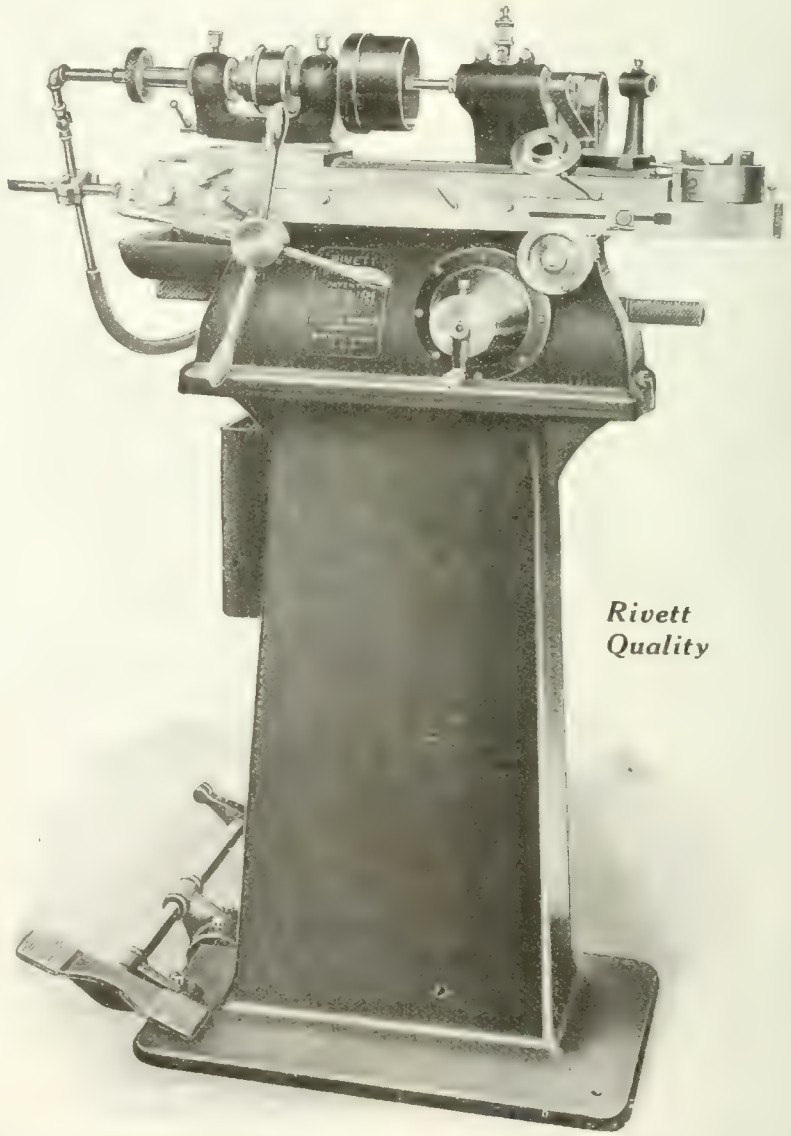

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A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XVIII. TORONTO, OCTOBER 25, 1917 No. 17

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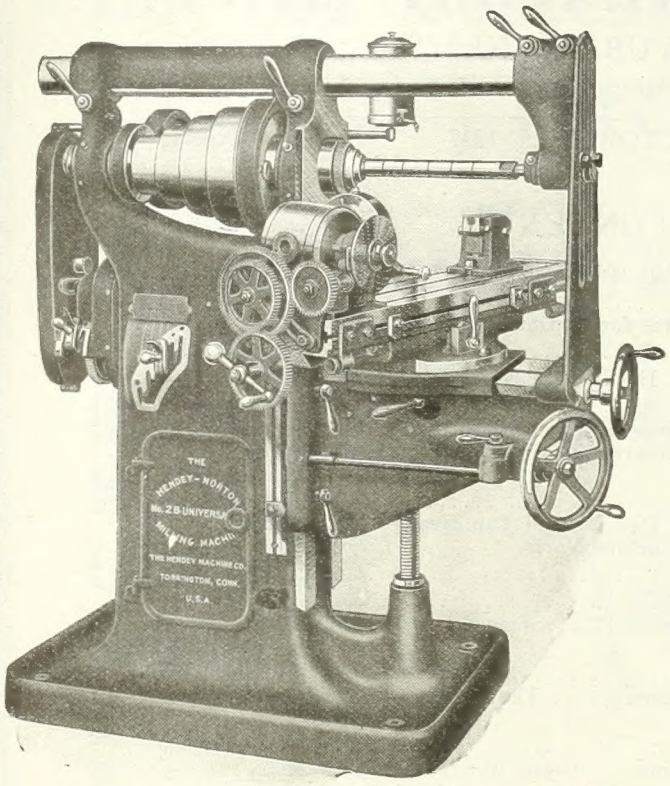

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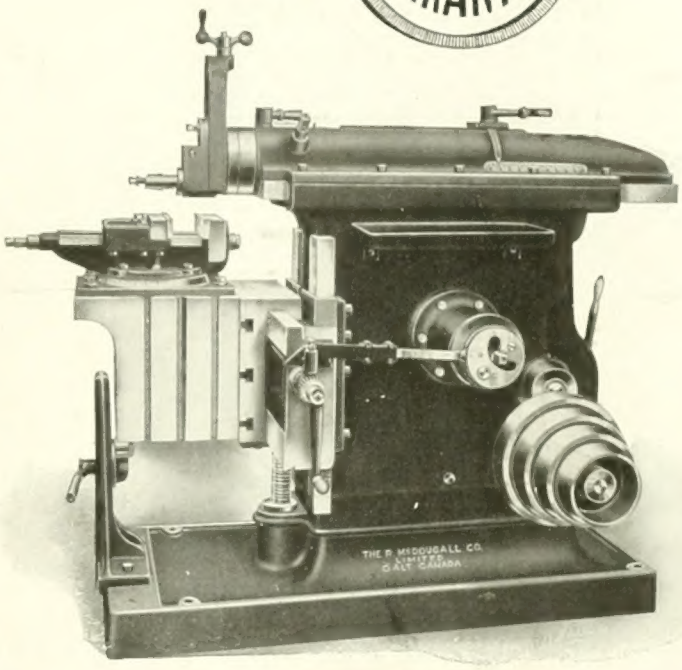

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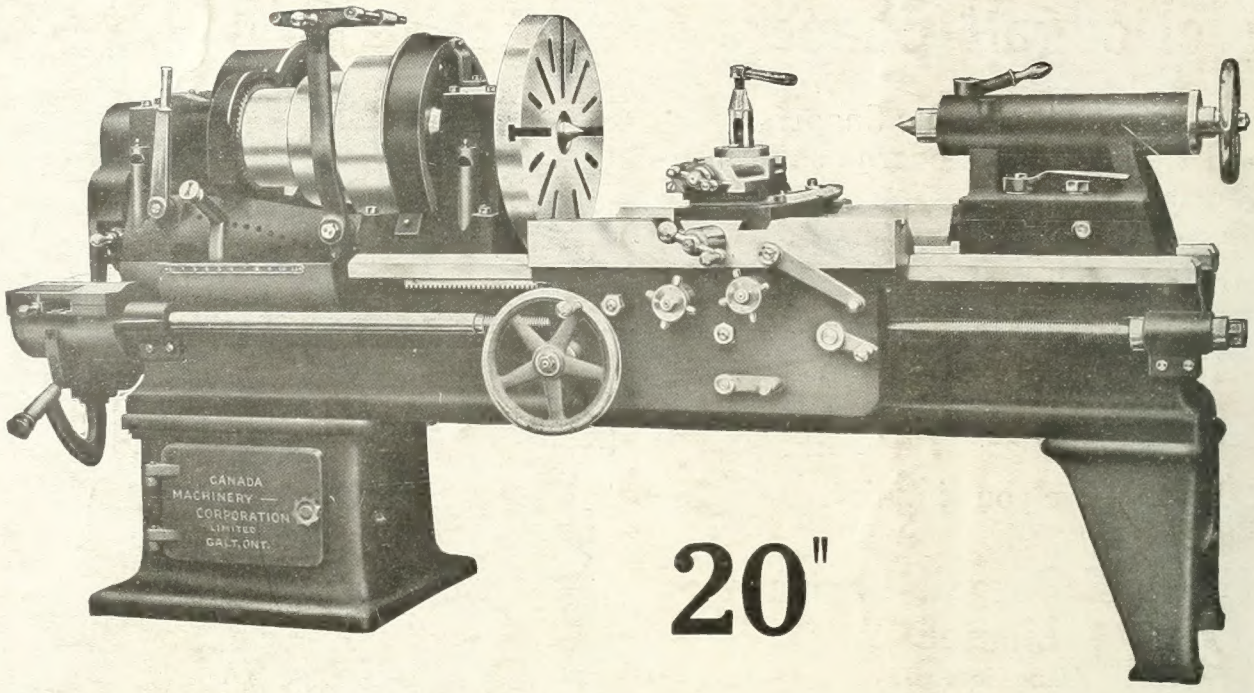

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